

**TOSHKENT DAVLAT YURIDIK UNIVERSITETI HUZURIDAGI ILMIIY  
DARAJALAR BERUVCHI DSc.07/03.06.2023.Yu.22.04 RAQAMLI ILMIIY  
KENGASH**

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**TOSHKENT DAVLAT YURIDIK UNIVERSITETI**

**ABDIXAKIMOV ISLOMBEK BAHODIR O'G'LI**

**O'ZBEKISTONDA KVANT HUQUQINING RIVOJLANISH  
ISTIQBOLLARI**

**12.00.10 – Xalqaro huquq**

**Yuridik fanlar bo'yicha falsafa doktori (Doctor of Philosophy) dissertatsiyasi  
AVTOREFERATI**

**Toshkent – 2025**

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**Abdixakimov Islombek Bahodir o‘g‘li**

O‘zbekistonda kvant huquqining rivojlanish istiqbollari .....3

**Abdikhakimov Islombek Bahodir ugli**

The developmental perspectives of quantum law in Uzbekistan.....19

**Абдихакимов Исломбек Баходир огли**

Перспективы развития квантового права в Узбекистане.....35

**E‘lon qilingan ishlar ro‘yxati**

Список опубликованных работ

List of published works .....40

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**Yuridik fanlar bo'yicha falsafa doktori (PhD) dissertatsiyasi mavzusi O'zbekiston Respublikasi Oliy ta'lim, fan va innovatsiyalar vazirligi huzuridagi Oliy attestatsiya komissiyasida B2025.1.PHD/Yu1838.raqam bilan ro'yxatga olingan.**

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## KIRISH (falsafa doktori (PhD) dissertatsiyasi annotatsiyasi)

**Dissertatsiya mavzusining dolzarbligi va zarurati.** Dunyoda kvant texnologiyalarining jadal rivojlanishi ilm-fan va texnologiyalar sohasida inqilobiy o'zgarishlarga sabab bo'lmoqda. Statistik ma'lumotlarga ko'ra, kvant texnologiyalariga global investitsiyalar 2035-yilga borib 35 milliard AQSh dollaridan oshishi kutilmoqda. Ushbu texnologiyalar, xususan, kvant hisoblash, kriptografiya va kvant axborot nazariyasi orqali ko'plab sohalarni qayta shakllantirish va ularda yangi imkoniyatlarni ochib berish kuchiga ega. Biroq kvant texnologiyalarining murakkab va bashorat qilib bo'lmaydigan tabiati, xususan, ularning kiberxavfsizlik va ma'lumotlar maxfiyligiga tahdid solish imkoniyati, ularni huquqiy jihatdan tartibga solish zaruratini yuzaga keltiradi. Birlashgan Millatlar Tashkiloti Bosh kotibi Antoniu Guterrish bu boradagi xavf-xatarlarni ta'kidlab, shunday deydi: "Kvant hisoblash texnologiyalari kiberxavfsizlikni butkul izdan chiqarishi va murakkab tizimlarda jiddiy nosozliklar xavfini oshirishi mumkin. Biz esa hali bu borada xalqaro darajada tartibga soluvchi tizimning hatto dastlabki asoslarini ham yaratmadik.<sup>1</sup>" Shu bilan birga Birlashgan Millatlar Tashkiloti tomonidan 2025-yil "Xalqaro kvant ilm-fan va texnologiyalar yili" deb e'lon qilinishi ushbu yo'nalishda global muhokamalarni faollashtirishga zamin yaratmoqda<sup>2</sup>. Shunday ekan, kvant texnologiyalarining o'ziga xos xususiyatlarini, jumladan, ularning kiberxavfsizlik, shaxsiy hayot daxlsizligi va global infratuzilmalarga salbiy ta'sirini inobatga olgan holda, ularni huquqiy jihatdan tartibga solishga qaratilgan xalqaro va milliy yondashuvlarni ishlab chiqish va joriy etish bugungi kunda dolzarb ahamiyat kasb etmoqda.

Jahonda kvant texnologiyalarini rivojlantirish bo'yicha qator amaliy ishlar amalga oshirilmoqda. Jumladan, turli davlatlarda kvant hisoblash tizimlarini ishlab chiqish, ularni moliyalashtirish, ilmiy-tadqiqot institutlari faoliyatini kengaytirish, kvant aloqa vositalarini sinovdan o'tkazish va kvantga asoslangan kriptografiya usullarini ishlab chiqish kabi yo'nalishlarda izchil sa'y-harakatlar olib borilmoqda. Bu boradagi faoliyat nafaqat texnologik taraqqiyotga, balki milliy xavfsizlik, kiberxavfsizlik va shaxsiy ma'lumotlar himoyasini ta'minlash kabi dolzarb masalalarga ham bevosita ta'sir ko'rsatadi. Shu sababli, kvant texnologiyalaridan xavfsiz va mas'uliyatli foydalanishni ta'minlash, ularni boshqarish bo'yicha xalqaro qoidalarni ishlab chiqish, mavjud qonunchilikni yangilash, shuningdek, yangi huquqiy mexanizmlarni joriy etishga qaratilgan ilmiy yondashuvlarni shakllantirish zarurati ortib bormoqda.

Respublikamizda ilg'or ilmiy-texnologik rivojlanish va xalqaro standartlarga muvofiqlashtirish maqsadida, O'zbekiston Respublikasi tomonidan raqamli texnologiyalar, kiberxavfsizlik, intellektual mulk va ilmiy-texnik hamkorlik sohasida bir qator xalqaro shartnomalar ratifikatsiya qilindi, bu esa kvant texnologiyalari kabi yangi texnologik yo'nalishlarni huquqiy tartibga solish, xalqaro standartlarni qo'llash

<sup>1</sup> United Nations. (2022). Secretary-General's address to the General Assembly. Retrieved from <https://www.un.org/sg/en/content/sg/speeches/2022-09-20/secretary-generals-address-the-general-assembly>

<sup>2</sup> United Nations General Assembly. (2023, Dekabr 19). Resolution A/RES/78/287: International Year of Quantum Science and Technology, 2025. United Nations Digital Library. Retrieved July 23, 2025, from <https://docs.un.org/en/A/RES/78/287>

hamda milliy kiberxavfsizlik tizimini mustahkamlashga xizmat qiladi. O‘zbekiston Respublikasi Prezidenti Sh.Mirziyoyev ta’kidlaganidek: “Barqaror rivojlanishga erishish uchun biz raqamli bilimlarni va axborot texnologiyalarini chuqur o‘zlashtirishimiz kerak, bu esa bizga har tomonlama rivojlanishga erishish uchun eng qisqa yo‘ldan borishimizga imkon beradi. Bugungi dunyoda raqamli texnologiyalar barcha sohalarda hal qiluvchi rol o‘ynamoqda.”<sup>3</sup> Kvant texnologiyalarini tartibga soluvchi xalqaro huquqiy mexanizmlar, post-kvant kriptografiya standartlari, kvant hisoblashlari sohasidagi davlatlararo hamkorlik asoslari hamda ularning o‘ziga xos jihatlarini inobatga olgan holda, kvant texnologiyalari bo‘yicha xalqaro-huquqiy normalarni milliy qonunchilikka implementatsiya qilish va zamonaviy global texnologik tendentsiyalarga moslashish masalalarini chuqur o‘rganishni taqozo etadi.

Ushbu dissertatsiya tadqiqoti BMTning 1948-yil 10-dekabrda “Inson huquqlari umumjahon deklaratsiyasi”, 1966-yil 16-dekabrda “Iqtisodiy, ijtimoiy va madaniy huquqlar to‘g‘risida”gi Xalqaro pakt, 2001-yil 23-noyabrda “Kiberjinoyatlar to‘g‘risida”gi Budapesht konvensiyasi, Xalqaro telekommunikatsiya ittifoqi tomonidan qabul qilingan kvant aloqasi va kriptografiya standartlari hamda O‘zbekiston Respublikasining “Axborotlashtirish to‘g‘risida”gi qonuni, “Shaxsga doir ma’lumotlar to‘g‘risida”gi qonuni, “Kiberxavfsizlik to‘g‘risida”gi qonuni, O‘zbekiston Respublikasi Prezidentining 2020-yil 5-oktabrda ““Raqamli O‘zbekiston — 2030” strategiyasini tasdiqlash va uni samarali amalga oshirish chora-tadbirlari to‘g‘risida”gi PF-6079-son Farmoni, 2024-yil 15-avgustda “O‘zbekiston Respublikasida kriptologiya sohasida ta’lim va ilm-fanni rivojlantirish bo‘yicha qo‘shimcha chora-tadbirlar to‘g‘risida”gi PQ-293-son qarori hamda ilmiy-texnologik innovatsiyalar, kiberxavfsizlik, axborotni kriptografik himoyalash, ma’lumotlar himoyasi va xalqaro ilmiy-texnik hamkorlik sohaslariga oid boshqa normativ-huquqiy hujjatlarda belgilangan vazifalarni amalga oshirishga xizmat qiladi.

**Tadqiqotning respublika fan va texnologiyalari rivojlanishining ustuvor yo‘nalishlariga mosligi.** Dissertatsiya tadqiqoti respublika fan va texnologiyalar rivojlanishining I. “Axborotlashgan jamiyat va demokratik davlatni ijtimoiy, huquqiy, iqtisodiy, madaniy, ma’naviy-ma’rifiy rivojlantirishda innovatsion g‘oyalar tizimini shakllantirish va ularni amalga oshirish yo‘llari” ustuvor yo‘nalishi bo‘yicha bajarilgan.

**Muammoning o‘rganilganlik darajasi.** Ushbu tadqiqot ishi bilan bog‘liq muammolarining xalqaro-huquqiy jihatlarini kompleks ravishda o‘rganish masalasi alohida tadqiqot obyekti bo‘lmagan. Jumladan, kvant texnologiyalarini xalqaro huquqiy tartibga solish masalalarini yoritgan mamlakatimiz olimlaridan – S.Gulyamov, I.Rustambekov, S.Bozarov, A.Ubaydullayeva va boshqalarning ilmiy ishlarida muayyan darajada ko‘rib chiqilgan. Mazkur masalaga S.Gulyamov ilmiy ishlarida alohida e’tibor bergan bo‘lib, kvant texnologiyalarining an’anaviy kriptografiya va ma’lumotlarni himoya qilish tizimlariga tahdid solishini hamda

<sup>3</sup> “Shavkat Mirziyoyev Oliy Majlisga navbatdagi Murojaatnomani taqdim etadi” — 22-yanvar 2020. <https://president.uz/oz/lists/view/3309>

ularni yangilab, proaktiv va moslashuvchan huquqiy mexanizmlar joriy etish zarurligini ta'kidlagan<sup>4</sup>.

Mustaqil Davlatlar Hamdo'stligi mamlakatlarining olimlari – V. B. Naumov, G. V. Stankovsky, A. V. Minbaleev, A. A. Efremov, K. S. Evsikov, M. B. Dobrobaba, S. E. Channov, E. V. Kholodnaya, T. A. Polyakova va boshqalar tomonidan masalaning xalqaro-huquqiy jihatlarini o'rganilgan. Kvant texnologiyalarining axborot xavfsizligi jihatlarini esa, V.B.Naumov, G.V.Stankovskiy, K.S.Evsikov, A.A. Efremov kabi va boshqa olimlar ham o'rganagan.

Xorijda Jek Berd, Melissa K. Griffit, Elsa B. Kaniya, Markus Vagner, Andrea Renda, Sofi Duraffur kabi xorij olimlari kvant texnologiyalarini xalqaro xavfsizlik va eksport nazorati nuqtai nazaridan huquqiy tartibga solishni o'rganagan bo'lib, xalqaro hamkorlikning mintaqaviy mexanizmini hamda mazkur sohada kvant tahdidlariga qarshi kurashda inson huquqlarining ta'minlanishi masalalariga ko'proq to'xtalib o'tishgan.

Biroq yuqorida nomlari keltirilgan olimlarning ishlari asosan kvant texnologiyalarining xalqaro xavfsizlik, eksport nazorati va strategik barqarorlikka ta'siri kabi amaliy va normativ jihatlariga bog'ishlangan bo'lib, ularning xalqaro huquqiy tartibga solinishining umumiy nazariy asoslari hamda xalqaro shartnomaviy-huquqiy mexanizmlarining tizimli tahliliga yetarlicha e'tibor qaratilmagan; shu sababli bu sohani xalqaro huquq nuqtayi nazaridan kompleks tadqiq etish dolzarb bo'lib, mavjud va yuzaga kelayotgan xalqaro shartnomalarning huquqiy asoslarini o'rganish, tahlil qilish hamda takomillashtirish zaruriyatini yuzaga keltiradi.

**Dissertatsiya tadqiqotining dissertatsiya bajarilgan oliy ta'lim muassasasining ilmiy-tadqiqot ishlari rejalari bilan bog'liqligi.** Dissertatsiya mavzusi Toshkent davlat yuridik universitetining "Rivojlanayotgan texnologiyalar sohasida xalqaro huquqiy asoslarni shakllantirish, kiberxavfsizlikni ta'minlash hamda O'zbekiston Respublikasida raqamli va kvant huquqi sohasida xalqaro hamkorlikni mustahkamlash" ilmiy-tadqiqot rejasi doirasida amalga oshirildi.

**Tadqiqotning maqsadi** kvant texnologiyalarining xalqaro-huquqiy tartibga solinishi bilan bog'liq mavjud konseptual, normativ va institutsional muammolarni aniqlash, ushbu sohada xalqaro huquqning evolyutsion imkoniyatlarini tahlil qilish hamda O'zbekiston milliy qonunchiligida kvant huquqi asoslarini yaratishga oid huquqiy taklif va tavsiyalarni ishlab chiqishdan iborat.

**Tadqiqotning vazifalari:**

kvant texnologiyalarining tarixiy shakllanishi va xalqaro huquqda kvant huquq kontseptsiyasining dastlabki shakllanish bosqichlarini huquqiy tahlil qilish;

kvant huquqi tushunchasining shakllanishi, ilmiy-nazariy asoslarini, uslubiy yondashuvlarini va ularning xalqaro huquqdagi roli va ahamiyatini aniqlash;

kvant huquqining asosiy prinsiplari (suverenitet, texnoxavfsizlik, ikki tomonlama foydalanish nazorati va boshqalar) va uning xalqaro huquq normalariga integratsiyasi yo'llarini tahlil etish;

<sup>4</sup> Gulyamov, S. (2023). Quantum Law: Navigating the Legal Challenges and Opportunities in the Age of Quantum Technologies. *Uzbek Journal of Law and Digital Policy*, 1(1). <https://doi.org/10.59022/ujldp.54>

xalqaro tashkilotlarning kvant texnologiyalarini huquqiy tartibga solishdagi institutsional mexanizmlarini tahlil qilish va ularning funksional yondashuvlarini aniqlash;

mintaqaviy tashkilotlar doirasida kvant texnologiyalar bo'yicha tartibga solish amaliyoti va ularning huquqiy modellarini qiyosiy-huquqiy tahlil qilish;

xalqaro hamkorlik formatlari (shartnomalar, kodekslar, deklaratsiyalar) orqali kvant texnologiyalarini birgalikda tartibga solish mexanizmlarini o'rganish, kelishilgan prinsiplarga asoslangan yondashuvlarni ishlab chiqish;

O'zbekistonning kvant texnologiyalariga oid davlat siyosatini tahlil qilish, mavjud huquqiy infratuzilmaning holatini baholash hamda kvant huquqining normativ asoslarini ishlab chiqish bo'yicha takliflar berish;

O'zbekistonning xalqaro kvant huquqiy hamkorlikda ishtirok etish imkoniyatlarini tahlil qilish, ikki va ko'p tomonlama diplomatik yondashuvlarni aniqlash, huquqiy-muloqot mexanizmlarini taklif etish;

xalqaro kvant huquq normalarini O'zbekiston milliy qonunchiligiga implementatsiya qilishda yuzaga kelayotgan muammolarni aniqlash, ularni bartaraf etish bo'yicha huquqiy, tashkiliy va institutsional tavsiyalar ishlab chiqish.

**Tadqiqotning obyeksi sifatida** kvant texnologiyalarini huquqiy tartibga solish bilan bog'liq xalqaro huquqiy munosabatlar tizimi olingan.

**Tadqiqotning predmetini** kvant texnologiyalarini xalqaro huquqiy tartibga solishga doir xalqaro huquq va milliy qonunchilik normalari, xorijiy davlatlarning normativ-huquqiy tajribasi, xalqaro tashkilotlarning tartibga solish faoliyati, shuningdek, huquqshunoslik fanida mavjud bo'lgan konseptual yondashuvlar va ilmiy-nazariy qarashlar tashkil etadi.

**Tadqiqotning usullari.** Tadqiqotda tahlil etish, umumlashtirish, tizimli yondashuv, qiyosiy huquqiy, tarixiy, formal-yuridik tahlil, statistik ma'lumotlarni o'rganish kabi usullar qo'llanilgan.

**Tadqiqotning ilmiy yangiligi** quyidagilardan iborat:

xavfsizlik siyosati haqidagi, shu jumladan, tavakkalchiliklarni batafsil baholashni o'z ichiga olgan hujjat, shuningdek axborot xavfsizligini va kiberxavfsizlikni hamda to'lov xizmatidan foydalanuvchilarning himoya qilinishini ta'minlash asoslantirilgan;

kredit tashkilotlariga, to'lov tashkilotlariga, to'lov tizimlari operatorlariga, valyuta birjalariga va kredit byurolariga kiberxavfsizlikka tahdidlarning (shu jumladan bank kartalari bilan bog'liq talon-torojliklarning) oldini olish va (yoki) ularni bartaraf etish yuzasidan ijro etilishi majburiy bo'lgan ko'rsatmalar berishi hamda normativ hujjatlar qabul qilishi asoslab berilgan;

to'lov xizmatidan foydalanuvchilarning himoya qilinishini ta'minlash uchun tavakkalchiliklarni, shu jumladan firibgarlik hamda konfidensial va shaxsga doir ma'lumotlardan qonunga zid ravishda foydalanish xavflarini kamaytirish bo'yicha ko'riladigan choralarning tavsifi asoslantirilgan;

“axborotni muhofaza qilish” degan so'zlardan keyin “axborot tizimlari va resurslarining axborot xavfsizligini hamda kiberxavfsizligini ta'minlash asoslab berilgan;

huquq tizimida kvant huquqi tushunchasiga “kvant texnologiyalarini yaratish, qo‘llash, ularning transchegaraviy aylanishi hamda ulardan kelib chiqadigan ijtimoiy munosabatlarni tartibga soluvchi, an’anaviy huquqiy institutlarga (suverenitet, yurisdiksiya, dalillar huquqi, axborot xavfsizligi) ta’sirini baholovchi va yangi huquqiy normalar, tamoyillar va mexanizmlarni o‘z ichiga olgan kompleks huquq sohasidir” degan mualliflik ta’rifi ishlab chiqilgan.

**Tadqiqotning amaliy natijalari** quyidagilardan iborat:

kvant texnologiyalari sohasida xalqaro huquqiy hamkorlikni rivojlantirish maqsadida “Kvant texnologiyalari va tizimlarini yaratish hamda foydalanish tartibi to‘g‘risida”gi xalqaro konvensiya loyihasi ishlab chiqish zaruriyati asoslangan;

kvant texnologiyalari sohasidagi huquqbuzarliklarni oldini olish va ularga qarshi kurashish bo‘yicha xalqaro hamkorlikni amalga oshirishda nazorat organlarining vakolatlarini integratsiyalash lozimligi asoslab berilgan;

kvant kriptografiyasi va kvant kommunikatsiyalari tizimlarini joriy etishda davlatlararo axborot almashishning yagona xalqaro platformasi modeli ishlab chiqish zaruriyati asoslangan;

kvant texnologiyalari sohasidagi xalqaro huquqiy hamkorlikning kontseptual asoslari ishlab chiqish va amaliyotga joriy etish lozimligi asoslangan;

kvant texnologiyalari sohasida xalqaro hamkorlikni rivojlantirish uchun mintaqaviy huquqiy hujjatlar ishlab chiqish zaruriyati asoslangan;

kvant texnologiyalari sohasida xavfsizlikni ta’minlash bo‘yicha xalqaro audit tizimining huquqiy asoslari yaratish lozimligi asoslangan.

**Tadqiqot natijalarining ishonchliligi.** Tadqiqot natijalari milliy qonun normalari, rivojlangan davlatlar tajribasi, qonunni qo‘llash amaliyoti, statistik ma’lumotlarni tahlil qilish natijalari umumlashtirilib, tegishli hujjatlar bilan rasmiylashtirilgan. Xulosa, taklif va tavsiyalar aprotatsiyadan o‘tkazilib, ularning natijalari yetakchi milliy va xorijiy nashrlarda e’lon qilingan. Olingan natijalar amaliyotga joriy qilingan.

**Tadqiqot natijalarining ilmiy va amaliy ahamiyati.** Tadqiqot ishining ilmiy ahamiyati undagi ilmiy-nazariy xulosalar, taklif va tavsiyalardan kelgusi ilmiy faoliyatda, qonun ijodkorligida, huquqni qo‘llash amaliyotida, jinoyat ishlari bo‘yicha huquqiy yordamni amalga oshiruvchi maxsus vakolatli davlat organlarining faoliyatida jinoyat-protsessual qonunchilikning tegishli normalarini sharhlashda, milliy qonunchilikni takomillashtirish hamda “Xalqaro ommaviy huquq”, “Xalqaro inson huquqlari huquqi”, “Jinoyat iqtisodiy huquq” fanlarini ilmiy-nazariy jihatdan yanada boyitishda foydalanish mumkinligida namoyon bo‘ladi. Tadqiqot ishining nazariy asoslariga tayanish kelgusida kvant texnologiyalarining xalqaro-huquqiy tartibga solinishi bilan bog‘liq yangi ilmiy izlanishlarni olib borish, kvant sohasidagi xalqaro shartnomaviy va institutsional mexanizmlarni takomillashtirish, hamda xalqaro-huquqiy normalarni milliy qonunchilikka implementatsiya qilish bo‘yicha amaliy takliflar ishlab chiqishga zamin yaratadi.

Tadqiqot natijalarining amaliy ahamiyati kvant texnologiyalarini huquqiy tartibga solish sohasidagi xalqaro va milliy qonun hujjatlarini takomillashtirish, huquqni qo‘llash amaliyotini rivojlantirish, kvant texnologiyalariga oid mavjud xalqaro huquqiy hujjatlarni inventarizatsiyadan o‘tkazish, ushbu sohada faoliyat

yurituvchi xalqaro tashkilotlar hamda vakolatli davlat organlarining tartibga solish va nazorat qilish sohasidagi faoliyatini takomillashtirishga bag'ishlangan qonun hujjatlarini ishlab chiqishda xizmat qiladi.

**Tadqiqot natijalarining joriy qilinishi.** Tadqiqot natijalaridan quyidagilarda foydalanilgan:

xavfsizlik siyosati haqidagi, shu jumladan tavakkalchiliklarni batafsil baholashni o'z ichiga olgan hujjat, shuningdek axborot xavfsizligini va kiberxavfsizlikni hamda to'lov xizmatidan foydalanuvchilarning himoya qilinishini ta'minlashga oid taklifi "To'lovlar va to'lov tizimlari to'g'risida"gi O'RQ-578-sonli Qonunining 24-modda ikkinchi qismining to'qqizinchi xatboshisini ishlab chiqishda foydalanilgan (O'zbekiston Respublikasi Oliy majlisi senatining sud-huquq masalalari va korrupsiyaga qarshi kurashish qo'mitasining 2024-yil 2-oktyabrdagi 23-sonli dalolatnomasi). Ushbu taklifning amalga oshirilishi to'lov xizmatlarida kvant texnologiyalarining xavfsizlik jihatlarini tartibga solishni kuchaytirish va zamonaviy tahdidlarga qarshi huquqiy himoya mexanizmlarini takomillashtirishga xizmat qilgan;

kredit ashkilotlariga, to'lov tashkilotlariga, to'lov tizimlari operatorlariga, valyuta birjalariga va kredit byurolariga kiberxavfsizlikka tahdidlarning (shu jumladan bank kartalari bilan bog'liq talon-torojliklarning) oldini olish va (yoki) ularni bartaraf etish yuzasidan ijro etilishi majburiy bo'lgan ko'rsatmalar berishi hamda normativ hujjatlar qabul qilishi bo'yicha taklifi "O'zbekiston Respublikasining Markaziy banki to'g'risida"gi 154-I-sonli Qonunining 12-modda birinchi qismini ishlab chiqishda foydalanilgan (O'zbekiston Respublikasi Oliy majlisi senatining sud-huquq masalalari va korrupsiyaga qarshi kurashish qo'mitasining 2024-yil 1-noyabr 24-sonli dalolatnomasi). Ushbu taklifning amalga oshirilishi Markaziy bankka moliya sektori subyektlarining kiberxavfsizligini ta'minlash bo'yicha majburiy ko'rsatmalar berish va nazorat mexanizmlarini joriy etish vakolatini berib, kvant texnologiyalari bilan bog'liq tahdidlarga qarshi kurashish tizimini takomillashtirishga xizmat qilgan;

to'lov xizmatidan foydalanuvchilarning himoya qilinishini ta'minlash uchun tavakkalchiliklarni, shu jumladan firibgarlik hamda konfidensial va shaxsga doir ma'lumotlardan qonunga zid ravishda foydalanish xavflarini kamaytirish bo'yicha ko'riladigan choralarning tavsifi bo'yicha taklifi "To'lovlar va to'lov tizimlari to'g'risida"gi O'RQ-578-sonli Qonunining 22-modda uchinchi qismining o'n birinchi xatboshisini ishlab chiqishda foydalanilgan (O'zbekiston Respublikasi Oliy majlisi senatining sud-huquq masalalari va korrupsiyaga qarshi kurashish qo'mitasining 2024-yil 1-noyabrdagi 23-sonli dalolatnomasi). Ushbu taklifning amalga oshirilishi to'lov xizmatidan foydalanuvchilarning maxfiy ma'lumotlarini kvant texnologiyalari yordamida firibgarlik va noqonuniy aralashuvlardan himoya qilish mexanizmlarini takomillashtirib, xavfsizlik tizimini kuchaytirishga xizmat qilgan;

"axborotni muhofaza qilish" degan so'zlardan keyin "axborot tizimlari va resurslarining axborot xavfsizligini hamda kiberxavfsizligini ta'minlash haqidagi taklifi O'zbekiston Respublikasining 2006-yil 4-aprelda qabul qilingan "Avtomatlashtirilgan bank tizimida axborotni muhofaza qilish to'g'risida"gi O'RQ-30-sonli Qonunining 4-moddasining ikkinchi xatboshisi hamda 5-moddasining ikkinchi xatboshisini ishlab chiqishda foydalanilgan (O'zbekiston Respublikasi Oliy majlisi senatining sud-huquq masalalari va korrupsiyaga qarshi kurashish

qo'mitasining 2024-yil 2-oktyabrdagi 23-sonli dalolatnomasi). Ushbu taklifning amalga oshirilishi avtomatlashtirilgan bank tizimlarida axborot xavfsizligini ta'minlash sohasini yangi kvant texnologiyalari tahdidlaridan himoyalash choralari kuchaytirib, bank tizimining kiberxavfsizligi darajasini oshirishga xizmat qilgan;

“kvant huquqi” tushunchasining mualliflik ta'rifi “Quantum Law” darsligi mazmuniga singdirilgan (Toshkent davlat yuridik universitetining 2025-yil 15-sentyabrdagi dalolatnomasi)

**Tadqiqot natijalarining aprobatsiyasi.** Mazkur tadqiqot natijalari 5 ta ilmiy anjumanda, jumladan, 3 ta xalqaro, 2 ta respublika ilmiy-amaliy anjumanlarida muhokamadan o'tkazilgan.

**Tadqiqot natijalarining e'lon qilinganligi.** Dissertatsiya mavzusi bo'yicha jami 18 ta ilmiy ish, jumladan, O'zbekiston Respublikasi Oliy ta'lim, fan va innovatsiyalar vazirligi huzuridagi Oliy attestatsiya komissiyasining doktorlik dissertatsiyalar asosiy natijalarini chop etish tavsiya etilgan ilmiy nashrlarda 13 ta ilmiy maqola (5 ta xorijiy nashrlarda) chop etilgan.

**Dissertatsiyaning tuzilishi va hajmi.** Dissertatsiya tarkibi kirish, uchta bob, xulosa, foydalanilgan adabiyotlar ro'yxati va ilovalardan iborat. Dissertatsiyaning hajmi 148 betni tashkil etgan.

## DISSERTATSIYANING ASOSIY MAZMUNI

Dissertatsiyaning **kirish** qismida tadqiqot mavzusining dolzarbligi va zarurati, tadqiqotning respublika fan va texnologiyalari rivojlanishining asosiy ustuvor yo'nalishlariga mosligi, tadqiq etilayotgan muammoning o'rganilganlik darajasi, dissertatsiya mavzusining dissertatsiya bajarilayotgan oliy ta'lim muassasasining ilmiy-tadqiqot ishlari rejaları bilan bog'liqligi, tadqiqotning maqsad va vazifalari, obyekt va predmeti, usullari, tadqiqotning ilmiy yangiligi va amaliy natijasi, tadqiqot natijalarining ishonchliligi, tadqiqot natijalarining ilmiy va amaliy ahamiyati, ularning joriy qilinganligi, tadqiqot natijalarining aprobatsiyasi, natijalarning e'lon qilinganligi, dissertatsiyaning hajmi va tuzilishi yoritib berilgan.

Dissertatsiyaning **“Xalqaro huquqda kvant huquqining nazariy asoslari”** deb nomlangan birinchi bobida kvant texnologiyalarining tarixiy rivojlanishi, xalqaro huquq tizimida kvant huquqi tushunchasining shakllanishi, nazariy va metodologik asoslari hamda xalqaro huquqda kvant huquqini boshqarishga oid asosiy prinsiplar va xususiyatlar yoritib berilgan. Shuningdek, kvant texnologiyalarining xalqaro huquqqa ta'siri, mavjud huquqiy vositalarning yetarlilik darajasi va kvant texnologiyalarining noyob xususiyatlariga mos ravishda yangi huquqiy mexanizmlar ishlab chiqish zarurati tahlil etildi.

Xususan, *“Kvant texnologiyalarining tarixi va xalqaro huquqda kvant huquqining dastlabki shakllanishi”* deb nomlangan birinchi paragrafda kvant texnologiyalarining rivojlanish bosqichlari va ushbu texnologiyalarning xalqaro huquq oldiga qo'yayotgan yangi vazifalari, mavjud xalqaro huquqiy tizimning mazkur texnologiyalarga nisbatan moslashish imkoniyatlari, shuningdek, yangi “kvant huquqi” tushunchasining zarurati kabi masalalar yoritib berilgan.

Dissertant kvant texnologiyalarining xalqaro-huquqiy jihatdan tartibga solish uchun alohida huquqiy yo‘nalish sifatida qaralishining afzalliklarini quyidagicha belgilab beradi: Birinchidan, kvant texnologiyalarining global ta’sir doirasi an’anaviy huquqiy yondashuvlar orqali to‘liq qamrab olinmasligi va ularni tartibga solishda yangi mexanizmlar zaruriyati; Ikkinchidan, kvant texnologiyalariga xos bo‘lgan “non-locality”, “entanglement”, “superpozitsiya” kabi xususiyatlar mavjud xalqaro huquq tizimida qamrab olinmagan bo‘lib, ular uchun maxsus prinsip va qoidalarning ishlab chiqilishi talab qilinadi; Uchinchidan, kvant texnologiyalarining tezkor rivojlanishi va ularning global xavfsizlikka ta’sirining oldindan ko‘rib chiqish zaruriyati xalqaro hamjamiyat oldida yangi huquqiy yo‘nalishni yaratish zarurligini yuzaga keltiradi.

Tahlil natijasida dissertant xalqaro hamjamiyat tomonidan kvant texnologiyalarining xalqaro huquqda tartibga solinishi bo‘yicha yagona universal shartnomalarning mavjud emasligini ta’kidlaydi hamda kvant texnologiyalariga tegishli xalqaro huquqiy hujjatlar asosan mintaqaviy tashkilotlar tomonidan ishlab chiqilganligini keltirib o‘tadi. Dissertantning fikriga ko‘ra, xalqaro miqyosda kvant texnologiyalari bilan bog‘liq tushunchalar va mexanizmlarning yagona standartga keltirilmaligi kelgusida xalqaro huquq sohasida noaniqliklar va huquqiy nizolarga sabab bo‘lishi mumkin. Shu bois, muallif kvant texnologiyalariga oid xalqaro huquqiy tushunchalar va prinsiplarning yagona umumxalqaro standartlarini ishlab chiqish zarurligini ilgari suradi.

Birinchi bobning ikkinchi paragrafi *“Kvant huquqining tushunchasi va nazariy-metodologik asoslari”* deb nomlanib, unda kvant huquqining xalqaro huquq doirasidagi o‘rni, ushbu yangi yo‘nalishni shakllantirish uchun zarur bo‘lgan nazariy va metodologik asoslar chuqur tahlil etildi. Tadqiqotchi kvant huquqining nazariy va metodologik asoslarini shakllantirishda xalqaro huquqning mavjud umumiy prinsiplaridan tashqari, kvant fizikasining o‘ziga xos xususiyatlarini ham hisobga olish zarurligini ta’kidlaydi. Tadqiqotda kvant huquqi yo‘nalishini xalqaro huquqning alohida sohasiga ajratish yoki mavjud xalqaro huquq tizimiga integratsiya qilish bo‘yicha olimlar o‘rtasidagi fikr-mulohazalar batafsil tahlil qilinib, dissertant o‘zining mualliflik pozitsiyasini ifodalab berdi.

Birinchi bobning uchinchi paragrafi *“Kvant huquqining asosiy prinsiplari va xususiyatlari”* deb nomlanib, unda kvant texnologiyalarining xalqaro huquq nuqtayi nazaridan tartibga solish uchun asos bo‘lib xizmat qiluvchi prinsiplari, ular orasida kvant suvereniteti, tinchlik uchun foydalanish, umumiy javobgarlik, interoperabilitet va adolatli kirish kabi asosiy prinsiplar tahlil qilindi.

Paragraf yakunida dissertant xalqaro hamjamiyat tomonidan ushbu prinsiplarga asoslangan yagona xalqaro huquqiy hujjatlar ishlab chiqilmaganligini ta’kidlab, kelgusida kvant huquqining samarali amalga oshirilishi uchun xalqaro va milliy qonunchilikni uyg‘unlashtirish va bu yo‘nalishda xalqaro huquqiy asoslarni mustahkamlash zarurligi haqida xulosa qiladi.

Dissertatsiyaning **“Kvant huquqi sohasida davlatlararo hamkorlikning xalqaro mexanizmlari”** deb nomlangan ikkinchi bobida kvant texnologiyalarining xalqaro-huquqiy tartibga solinishida ishtirok etayotgan xalqaro tashkilotlar, mintaqaviy tuzilmalar hamda davlatlararo hamkorlik mexanizmlari va ularning

samaradorligi yoritib berilgan. Bundan tashqari, xalqaro tashkilotlarning kvant huquqini shakllantirishdagi roli, mintaqaviy tashkilotlarning bu boradagi tajribalari va davlatlar o'rtasidagi ikki tomonlama hamkorlikning huquqiy asoslari tahlil etildi.

Xususan, "*Xalqaro darajada kvant huquqini tartibga solishning institutional asoslari*" deb nomlangan birinchi paragrafda kvant texnologiyalarini tartibga solishda mavjud xalqaro institutlarning roli, imkoniyatlari va cheklovlari, shuningdek, kelajakda ushbu institutlarni rivojlantirish yoki yangi mexanizmlar yaratish zarurati kabi masalalar yoritib berilgan.

Dissertant xalqaro tashkilotlar tomonidan kvant huquqi sohasida yagona universal xalqaro hujjatning mavjud emasligini hamda kvant texnologiyalari bilan bog'liq faoliyatlar Birlashgan Millatlar Tashkiloti (BMT), Xalqaro Telekomunikatsiya Ittifoqi (ITU), Jahon Intellektual Mulk Tashkiloti (WIPO) kabi xalqaro tashkilotlar tomonidan faqat texnik standartlar yoki me'yorlar bilan chegaralanib qolayotganini ta'kidlaydi. Muallif kvant texnologiyalarini samarali tartibga solish uchun xalqaro miqyosda maxsus huquqiy institut yoki xalqaro shartnomani ishlab chiqish lozimligi haqida xulosaga keladi.

Ikkinchi bobning "*Mintaqaviy tashkilotlar doirasida kvant huquqini tartibga solish asoslari*" deb nomlangan ikkinchi paragrafida kvant texnologiyalarining tartibga solinishiga oid mintaqaviy tashkilotlar tajribasi chuqur tahlil etilgan. Tadqiqotchi Yevropa Ittifoqi tomonidan qabul qilingan "Quantum Flagship" dasturi hamda boshqa mintaqaviy tashkilotlarning kvant texnologiyalariga oid strategik hujjatlar va standartlarni yaratish tajribasini o'rganib chiqadi. Tahlillar asosida mintaqaviy tashkilotlar kvant texnologiyalari bo'yicha xalqaro hamkorlikni mustahkamlashda muhim ahamiyatga ega ekanligi va ularning huquqiy tajribalarini global darajada qo'llash mumkinligi haqida xulosa qilinadi.

Ikkinchi bobning "*Kvant huquqi sohasida xalqaro hamkorlik mexanizmlari*" deb nomlangan uchinchi paragrafida davlatlar o'rtasida kvant texnologiyalarini tartibga solish bo'yicha hamkorlik mexanizmlarining mavjud shakllari tahlil etilgan. Muallif davlatlar o'rtasidagi ikki tomonlama va ko'p tomonlama hamkorlik shakllarini o'rganib, kvant texnologiyalari bo'yicha xalqaro hamkorlik mexanizmlarini quyidagi yo'nalishlarga bo'lib tahlil qiladi: kvant texnologiyalari va ular bilan bog'liq xavflar haqida axborot almashish; kvant texnologiyalari bo'yicha tadqiqotlarni qo'llab-quvvatlash; kvant texnologiyalarining tarqalishini nazorat qilish; noqonuniy kvant tizimlarini aniqlash va ularga qarshi choralar ko'rish; kvant texnologiyalari bilan bog'liq hodisalar yuzasidan tergovlar olib borish; dalillarni to'plash va kvant texnologiyalari bo'yicha huquqiy tartibni amalga oshirish.

Tadqiqotchi kvant texnologiyalari bo'yicha xalqaro hamkorlik mexanizmlarini yanada samarali qilish uchun xalqaro shartnomalar va davlatlararo kelishuvlarni takomillashtirish, yangi xalqaro huquqiy standartlarni ishlab chiqish, mavjud shartnomalarning implementatsiyasini milliy qonunchilikka moslashtirish lozimligini asoslab beradi.

Paragraf yakunida dissertant O'zbekiston Respublikasi tomonidan ratifikatsiya qilingan xalqaro hujjatlar asosida kvant texnologiyalari bilan bog'liq xalqaro hamkorlikni rivojlantirish zarurligi, milliy qonunchilikka xalqaro standartlarni implementatsiya qilish orqali kvant texnologiyalari bilan bog'liq bo'lgan xavflarning

oldini olish va mamlakat manfaatlarini himoya qilish imkoniyatlari haqida xulosa qiladi.

Dissertatsiyaning **“O‘zbekiston Respublikasida kvant huquqi konsepsiyasining shakllanishi”** deb nomlangan uchinchi bobida O‘zbekistonda kvant texnologiyalari bo‘yicha davlat siyosati, mamlakatda kvant huquqini shakllantirish istiqbollari, xalqaro hamkorlik uchun mavjud imkoniyatlar va xalqaro standartlarni milliy qonunchilikka implementatsiya qilish bilan bog‘liq masalalar yoritib berilgan. Bundan tashqari, kvant texnologiyalarining huquqiy tartibga solinishiga oid mavjud qonunchilikdagi bo‘shliqlar, ularni to‘ldirish zarurati hamda milliy qonunchilikni xalqaro kvant standartlariga moslashtirish imkoniyatlari atroflicha tahlil etildi.

Xususan, *“O‘zbekistonda kvant texnologiyalar bo‘yicha davlat siyosati va kvant huquqi asoslarining yaratilishi”* deb nomlangan birinchi paragrafda O‘zbekistonda kvant texnologiyalarini rivojlantirish va ularni huquqiy jihatdan tartibga solish bo‘yicha davlat tomonidan amalga oshirilayotgan choralalar, strategiyalar va huquqiy tashabbuslar yoritib berilgan.

Dissertant O‘zbekiston Respublikasida kvant texnologiyalarini tartibga solish bo‘yicha aniq huquqiy bazaning mavjud emasligini, ammo bu sohadagi milliy qonunchilikda mavjud bo‘lgan umumiy qonun hujjatlari va me‘yoriy hujjatlar orqali bilvosita tartibga solinishini ta’kidlaydi. Shu bilan birga, kvant texnologiyalari uchun maxsus qonunchilik bazasini yaratish va bu yo‘nalishdagi xalqaro tajribani o‘rganish, shuningdek, ularni milliy qonunchilikka moslashtirish zarurligi haqida xulosaga keladi.

Uchinchi bobning *“Kvant huquqi sohasida O‘zbekistonning xalqaro hamkorlik imkoniyatlari va istiqbollari”* deb nomlangan ikkinchi paragrafida O‘zbekiston Respublikasining kvant huquqi yo‘nalishida xalqaro hamkorlikni amalga oshirish bo‘yicha mavjud imkoniyatlari, davlatning geosiyosiy o‘rni hamda diplomatik va huquqiy salohiyati chuqur tahlil etilgan. Tadqiqotchi O‘zbekistonning Yevropa Ittifoqi, AQSh, Xitoy, Hindiston kabi kvant texnologiyalari bo‘yicha yetakchi davlatlar bilan hamkorlikni rivojlantirish imkoniyatlari mavjudligini, shuningdek, mintaqaviy tashkilotlar va xalqaro institutlar bilan hamkorlik orqali milliy kvant qonunchiligini xalqaro standartlarga yaqinlashtirish mumkinligini asoslab beradi. Paragraf yakunida O‘zbekiston Respublikasining xalqaro kvant hamjamiyatida faol ishtirok etishi mamlakatning kvant texnologiyalaridan foydalanish va ularni tartibga solish bo‘yicha xalqaro huquqiy tashabbuslarda o‘z o‘rniga ega bo‘lishiga xizmat qilishini ta’kidlaydi.

Uchinchi bobning *“Xalqaro kvant huquqi standartlarini O‘zbekiston qonunchiligiga joriy etish masalalari”* deb nomlangan uchinchi paragrafida kvant texnologiyalariga oid xalqaro-huquqiy standartlarni milliy qonunchilikka joriy etish imkoniyatlari, bu jarayondagi mavjud muammolar va yechimlar tahlil etilgan. Muallif xalqaro huquqiy standartlarni milliy qonunchilikka implementatsiya qilishda xalqaro shartnomalarni ratifikatsiya qilish va milliy qonunchilikdagi mavjud bo‘shliqlarni to‘ldirish zarurligini ta’kidlaydi. Dissertant O‘zbekistonda kvant texnologiyalarini huquqiy jihatdan tartibga soluvchi maxsus qonunchilik aktlari ishlab chiqilishi,

qonunchilikka xalqaro standartlarni bosqichma-bosqich implementatsiya qilish orqali huquqiy noaniqliklarni bartaraf etish mumkinligini asoslab beradi.

Paragraf yakunida dissertant O'zbekiston Respublikasi tomonidan xalqaro kvant huquqi standartlarini milliy qonunchilikka implementatsiya qilish orqali mamlakat manfaatlarini xalqaro darajada samarali himoya qilish, kvant texnologiyalari bilan bog'liq xavflarni oldini olish va davlatning xalqaro miqyosda obro'sini mustahkamlash uchun sharoit yaratilishini ta'kidlaydi.

## XULOSA

Kvant huquqi sohasida xalqaro hamkorlikni takomillashtirish va O'zbekiston Respublikasining milliy manfaatlarini ta'minlashga qaratilgan huquqiy asoslarni yaratish masalalarini kompleks ravishda o'rganish va tahlil qilishga bag'ishlangan ilmiy tadqiqotning natijalari bo'yicha ishlab chiqilgan taklif va tavsiyalarni quyidagi uch yo'nalishda shakllantirish maqsadga muvofiq:

**Birinchi yo'nalish – xalqaro va milliy kvant huquqiga oid nazariy qoidalarni rivojlantirish bo'yicha quyidagi ilmiy-nazariy xulosalarga kelindi:**

1. Jahonda kvant texnologiyalarining huquqiy tartibga solinishi bo'yicha turli yondashuvlar mavjud bo'lsa-da, ularni birlashtiruvchi yagona konsepsiya yoki umumiy ta'rif hali to'liq shakllanmagan. Shu munosabat bilan, tadqiqotda kvant texnologiyalarining noyob xususiyatlarini (chalkashlik, superpozitsiya, noaniqlik) inobatga olgan holda "Kvant huquqi" tushunchasiga quyidagi mualliflik ta'rifi ishlab chiqildi: *Kvant huquqi – bu kvant texnologiyalarini yaratish, qo'llash, ularning transchegaraviy aylanishi hamda ulardan kelib chiqadigan ijtimoiy munosabatlarni tartibga soluvchi, an'anaviy huquqiy institutlarga (suverenitet, yurisdiksiya, dalillar huquqi, axborot xavfsizligi) ta'sirini baholovchi va yangi huquqiy normalar, tamoyillar va mexanizmlarni o'z ichiga olgan kompleks huquq sohasidir.*

2. Kvant texnologiyalari davlatlarning raqamli infratuzilmasi va ma'lumotlar bazalari ustidan nazoratini yangi bosqichga olib chiqishi munosabati bilan xalqaro huquqda "Kvant suvereniteti" tushunchasiga ehtiyoj yuzaga kelmoqda. Ushbu tushunchaga quyidagicha mualliflik ta'rifi berildi: *Kvant suvereniteti – bu davlatning o'z milliy manfaatlari, xavfsizligi va iqtisodiy barqarorligini ta'minlash maqsadida o'z hududidagi kvant infratuzilmasi, kvant ma'lumotlar oqimi va kvant kommunikatsiya kanallarini mustaqil ravishda tartibga solish, nazorat qilish va himoya qilish bo'yicha mutlaq huquqidir.*

3. Kvant huquqini tartibga solishning samarali tizimini yaratish uchun uning asosiy tamoyillarini belgilash muhim ahamiyatga ega. Dissertatsiyada kvant huquqining asosiy prinsiplari sifatida quyidagilar taklif etildi:

**Umumhuquqiy tamoyillar:** qonuniylik, inson huquqlarini hurmat qilish, xalqaro majburiyatlarni vijdonan bajarish, davlat suverenitetini hurmat qilish.

**Maxsus tamoyillar:** kvant texnologiyalaridan tinch maqsadlarda foydalanish; shaffoflik va hisobdorlik ; mas'uliyatni taqsimlash (ayniqsa, chalkash kvant tizimlarida); global miqyosda texnik o'zaro muvofiqlik (interoperability); kvant texnologiyalari yutuqlaridan adolatli foydalanish va "kvant tafovuti"ning oldini olish.

4. Kvant ma'lumotlari an'anaviy raqamli ma'lumotlardan tubdan farq qiluvchi xususiyatlarga (kvant chalkashlik, superpozitsiya holati) ega bo'lganligi sababli, ularga nisbatan maxsus huquqiy rejim joriy etilishi lozim. Bu esa "Kvant ma'lumotlari huquqiy rejimi" tushunchasiga ehtiyojni yuzaga keltirmoqda. Ushbu tushunchaga quyidagicha mualliflik ta'rifi berildi: *Kvant ma'lumotlari huquqiy rejimi – bu kvant holatidagi axborotni yaratish, saqlash, uzatish, o'zgartirish va yo'q qilish jarayonlarini tartibga soluvchi, kvant kriptografiya va kvant teleportatsiya xususiyatlarini hisobga olgan holda ma'lumotlar konfidensialligini, yaxlitligini va mavjudligini ta'minlovchi maxsus huquqiy normalar va mexanizmlar tizimidir.*

5. BMT Nizomi, xalqaro gumanitar huquq va inson huquqlari normalaridan kelib chiqib, davlatlarning kvant texnologiyalardan foydalanishda yangi xalqaro-huquqiy majburiyatlar tizimini shakllantirish zarur va bu "Kvant texnologiyalardan foydalanishda davlatlarning xalqaro majburiyatlari" tushunchasiga ehtiyoj yaratadi. Shunga ko'ra, ushbu tushunchaga mualliflik ta'rifi ishlab chiqildi. Kvant texnologiyalardan foydalanishda davlatlarning xalqaro majburiyatlari - *bu davlatlarning kvant qurollanish poygasini cheklash, kvant kiberxujumlardan tiyilish (xalqaro gumanitar huquqning ajratish tamoyili), kvant kuzatuv tizimlarida shaxsiy daxlsizlikni hurmat qilish bo'yicha erga omnes (barcha davlatlar oldidagi) majburiyatlar kompleksidir.*

**Ikkinchi yo'nalish – kvant huquqi sohasida xalqaro hamkorlikni huquqiy tartibga solish asoslarini takomillashtirishga qaratilgan bir qator takliflar ishlab chiqildi:**

6. Hozirgi kunda kvant texnologiyalari sohasidagi xalqaro munosabatlar asosan ikki tomonlama kelishuvlar va parcha-parcha "yumshoq huquq" normalari bilan tartibga solinmoqda. Bu huquqiy bo'shliqlarni bartaraf etish va global standartlarni yaratish maqsadida BMT shafeligida "Kvant texnologiyalarini yaratish, ulardan foydalanish va tarqatish tartibi to'g'risida"gi universal konvensiya loyihasini ishlab chiqish va qabul qilish taklif etiladi. Konvensiyada kvant texnologiyalarining ta'rifi, ulardan tinch maqsadda foydalanish kafolatlari, post-kvant kriptografiyasiga o'tish majburiyatlari, kvant qurol-yarog'ini yaratmaslik va tarqatmaslik, shuningdek, rivojlanayotgan davlatlar uchun texnologiyalar transferi masalalari o'z aksini topishi lozim.

7. BMTning "Kvant texnologiyalarini yaratish, ulardan foydalanish va tarqatish tartibi to'g'risida"gi yangi konvensiyasini qabul qilish jarayonida unga kvant kompyuterlari yordamida amalga oshirilishi mumkin bo'lgan kiberhujumlarga qarshi kurashish bo'yicha alohida bob kiritish. Ushbu bobda kvantga chidamli shifrlash standartlarini majburiy joriy etish, kiberjinoyatlarni tergov qilishda xalqaro hamkorlikni kuchaytirish va bu jarayonga kvant texnologiyalari bo'yicha mutaxassislarni jalb etish hamda davlatlararo yagona axborot almashinuvi platformasini yaratish nazarda tutilishi kerak.

8. Mavjud xalqaro shartnomalarni kvant davri talablariga moslashtirish. Xususan, Ikki tomonlama qo'llaniladigan tovarlar va texnologiyalar eksportini nazorat qilish bo'yicha Vassenaar kelishuvlari ro'yxatiga kvant kompyuterlari kiritilganini inobatga olib, kelishuvga kvant sensorlari, kvant radar tizimlari va

maxsus kvant algoritmlarini ham kiritish orqali uning qamrovini kengaytirish taklif etiladi.

9. Xalqaro miqyosda Global Kvant Boshqaruvi Doiraviy Kelishuvini tashkil etish. Ushbu tuzilma huquqiy (konvensiyalar), texnik (standartlar) va tenglik (rivojlanayotgan mamlakatlarga yordam) ustunlariga asoslanib, BMT, ITU, ISO, WIPO kabi tashkilotlar faoliyatini muvofiqlashtiruvchi markaz vazifasini bajarishi mumkin.

10. Xalqaro miqyosda “Kvant texnologiyalarini standartlashtirish va sertifikatlash bo‘yicha xalqaro protocol”ni ishlab chiqish va qabul qilish. Ushbu protokol doirasida kvant qurilmalarining xavfsizlik darajalarini baholash (kvant xavfsizlik sertifikat), kvant algoritmlarining ishonchliligini tekshirish va kvant kriptografik protokollarning mustahkamligini tasdiqlash mexanizmlari joriy etilishi lozim. Kvant texnologiyalarining transchegaraviy xarakterini va texnik o‘zaro muvofiqlik tamoyilini hisobga olgan holda, turli davlatlarda ishlab chiqilayotgan kvant tizimlarining o‘zaro muvofiqligi va xavfsizligini ta’minlash uchun yagona xalqaro standartlar zarur.

11. Dissertatsiyada keltirilgan kvant suvereniteti konsepsiyasi va shaffoflik tamoyilidan kelib chiqib, davlatlarning kvant texnologiyalardan foydalanish bo‘yicha xalqaro majburiyatlariga rioya etilishini monitoring qilish tizimini yaratish zarur. Taklif etilayotgan “Xalqaro kvant texnologiyalar monitoringi va muvofiqlik markazi” davlatlarning kvant infratuzilmasini rivojlantirish bo‘yicha yillik hisobotlarini qabul qilish, kvant qurollanish sohasidagi faoliyatni kuzatish, post-kvant kriptografiyaga o‘tish jarayonini monitoring qilish va kvant texnologiyalardan tinchliksevar maqsadlarda foydalanish kafolatlarini tekshirish funksiyalarini bajarishi lozim. Markaz dissertatsiyada ta’kidlangan “kvant tafovuti”ning oldini olish tamoyilidan kelib chiqib, rivojlanayotgan davlatlarga kvant texnologiyalarni joriy etishda texnik yordam ko‘rsatish, kvant mutaxassislarini tayyorlash dasturlarini muvofiqlashtirish va kvant texnologiyalar sohasidagi eng yaxshi amaliyotlar (best practices) to‘plamini shakllantirish vazifalarini ham amalga oshirishi kerak. Monitoring natijalariga ko‘ra markaz BMT Bosh Assambleyasiga yillik hisobot taqdim etishi va kvant texnologiyalar sohasida yuzaga kelayotgan yangi huquqiy muammolar bo‘yicha tavsiyalar ishlab chiqishi nazarda tutiladi.

**Uchinchi yo‘nalish – O‘zbekiston Respublikasida xalqaro kvant huquqi standartlarini implementatsiya qilish va milliy qonunchilikni takomillashtirish bo‘yicha quyidagi tavsiyalar ishlab chiqildi:**

12. O‘zbekiston Respublikasi Raqamli texnologiyalar vazirligi, Adliya vazirligi, Oliy ta’lim, fan va innovatsiyalar vazirligi, Davlat xavfsizlik xizmati va Bosh prokuratura vakillaridan iborat Kvant texnologiyalari bo‘yicha idoralararo kengashni tashkil etish. Kengashning asosiy vazifasi sohadagi yagona davlat siyosatini belgilovchi “O‘zbekistonning Milliy Kvant Strategiyasi” loyihasini ishlab chiqish va xalqaro standartlarni milliy qonunchilikka implementatsiya qilish jarayonini muvofiqlashtirishdan iborat bo‘ladi.

13. O‘zbekiston Respublikasining “Axborotlashtirish to‘g‘risida”gi Qonunini quyidagi mazmundagi yangi modda bilan to‘ldirish maqsadga muvofiq hisoblanadi:

## **6<sup>1</sup>-modda. Kvant texnologiyalari sohasidagi davlat siyosati va huquqiy tartibga solish asoslari**

O'zbekiston Respublikasida kvant texnologiyalari sohasidagi davlat siyosati milliy xavfsizlikni ta'minlash, innovatsion rivojlanishni rag'batlantirish va xalqaro standartlarga integratsiyalashuvga qaratiladi.

Davlat organlari va muhim axborot infratuzilmasi subyektlari o'z axborot tizimlari va ma'lumotlar bazalarini kvant kompyuterlari tahdidlaridan himoya qilish maqsadida vakolatli davlat organi tomonidan belgilangan tartibda va muddatlarda post-kvant kriptografiyasi standartlariga o'tishlari shart.

O'zbekiston Respublikasining milliy manfaatlariga xizmat qiluvchi muhim kvant infratuzilmasi (kvant kommunikatsiya tarmoqlari, kvant sensorlari tizimlari) milliy yurisdiksiyada bo'lishi ta'minlanadi va ularning faoliyati davlat tomonidan nazorat qilinadi (kvant suvereniteti).

Kvant texnologiyalari sohasidagi faoliyatni muvofiqlashtirish, normativ-huquqiy bazani takomillashtirish va xalqaro hamkorlikni rivojlantirish vakolatli Idoralararo kengash tomonidan amalga oshiriladi.

14. O'zbekiston Respublikasining "Elektron raqamli imzo to'g'risida"gi Qonunning 8-moddasi ikkinchi qismi quyidagi mazmundagi yangi xatboshi bilan to'ldirilishi taklif etiladi:

"elektron raqamli imzodan foydalanish uchun majburiy bo'lgan kriptografik algoritmlar va protokollar ro'yxatini tasdiqlash, shuningdek, zamonaviy tahdidlar va xalqaro standartlarni, shu jumladan post-kvant kriptografiyasi (kvantga chidamli) standartlarini inobatga olgan holda ushbu ro'yxatni muntazam ravishda yangilab borish maqsadga muvofiq deb topilsin;"

Bu o'zgarish Raqamli texnologiyalar vazirligiga davlat va fuqarolik-huquqiy munosabatlarda qo'llaniladigan barcha ERILar uchun kvantga chidamli shifrlash standartlarini o'z vaqtida joriy etish majburiyatini yuklashi mumkin.

15. O'zbekiston Respublikasining "To'lovlar va to'lov tizimlari to'g'risida"gi qonunining 21-moddasi ikkinchi qismi quyidagi mazmundagi yangi xatboshi bilan to'ldirilishi taklif etiladi:

"to'lov tizimlari operatorlari va to'lov xizmatlarini yetkazib beruvchilar tomonidan qo'llanilishi majburiy bo'lgan kriptografik himoya vositalari ro'yxatini tasdiqlash va xalqaro post-kvant kriptografiyasi standartlariga muvofiq uni muntazam yangilab borish;"

Ushbu taklif Markaziy bankka mamlakat moliya tizimini, shu jumladan bank operatsiyalari va to'lov infratuzilmasini kvant kompyuterlari yordamida amalga oshirilishi mumkin bo'lgan kiberhujumlardan himoya qilish uchun zarur bo'lgan kvantga chidamli shifrlash standartlarini belgilash va ularga o'tishni nazorat qilish bo'yicha aniq vakolat berishi mumkin.

16. Markaziy Osiyo davlatlari bilan mintaqaviy hamkorlikni kuchaytirish tavsiya etiladi. Xususan, O'zbekiston qo'shni davlatlar bilan birgalikda mintaqaviy kvant xavfsizligi tizimini yaratish, umumiy standartlar ishlab chiqish va qo'shma tadqiqot platformalarini tashkil etish tashabbusini ilgari surishi mumkin. Bunday hamkorlik mintaqaning barqarorligini oshiradi, kvant texnologiyalaridan xavfsiz foydalanishni ta'minlaydi va milliy qonunchilik islohotlarining amaliy ahamiyatini yanada kuchaytiradi.

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UNIVERSITY OF LAW**

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**TASHKENT STATE UNIVERSITY OF LAW**

**ABDIKHAKIMOV ISLOMBEK BAHODIR UGLI**

**THE DEVELOPMENTAL PERSPECTIVES OF QUANTUM LAW  
IN UZBEKISTAN**

**12.00.10 – International law**

**ABSTRACT**  
**of the dissertation of the Doctor of Philosophy in Legal Sciences (PhD)**

**Tashkent – 2025**

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The doctoral dissertation is available at the Information Resource Center of Tashkent State university of Law (registered as no. 1438). (Address: 100047, AmirTemura street 13. Tashkent city. Phone: +998 71 71-233-66-36

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## INTRODUCTION

(abstract of the dissertation of the Doctor of Philosophy (PhD))

**Relevance and Necessity of the Dissertation Topic.** Rapid developments in quantum technologies in the world are causing revolutionary changes in the field of science and technology. According to statistical data, global investments in quantum technologies are expected to exceed 35 billion US dollars by 2035. These technologies, in particular through quantum computing, cryptography, and quantum information theory, have the power to reshape many sectors and unlock new opportunities in them. However, the complex and unpredictable nature of quantum technologies, in particular their potential to threaten cybersecurity and data privacy, necessitates the need to regulate them legally. United Nations Secretary-General António Guterres, emphasizing the risks in this regard, says: "Quantum computing technologies can completely undermine cybersecurity and increase the risk of serious malfunctions in complex systems. We have not yet even created the initial foundations of an international regulatory system in this area."<sup>1</sup> At the same time, the declaration by the United Nations of 2025 as the "International Year of Quantum Science and Technology" is creating grounds for activating global discussions in this direction<sup>2</sup>. Therefore, taking into account the specific characteristics of quantum technologies, including their negative impact on cybersecurity, privacy, and global infrastructure, the development and implementation of international and national approaches aimed at their legal regulation is currently of urgent importance.

A number of practical works are being carried out worldwide on the development of quantum technologies. In particular, consistent efforts are being undertaken in various countries in the directions of developing quantum computing systems, financing them, expanding the activities of scientific research institutions, testing quantum communication tools, and developing quantum-based cryptography methods. This activity not only affects technological progress, but also has a direct impact on urgent issues such as ensuring national security, cybersecurity, and protection of personal data. For this reason, the need is growing to ensure safe and responsible use of quantum technologies, develop international rules for their management, update existing legislation, and also formulate scientific approaches aimed at implementing new legal mechanisms.

In order to achieve advanced scientific and technological development and align with international standards in our Republic, the Republic of Uzbekistan has ratified a number of international agreements in the fields of digital technologies, cybersecurity, intellectual property, and scientific and technical cooperation, which serves to legally regulate new technological directions such as quantum technologies, apply international standards, and strengthen the national cybersecurity system. As emphasized by the President of the Republic of Uzbekistan

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<sup>1</sup> United Nations. (2022). Secretary-General's address to the General Assembly. Retrieved from <https://www.un.org/sg/en/content/sg/speeches/2022-09-20/secretary-generals-address-the-general-assembly>

<sup>2</sup> United Nations General Assembly. (2023, Dekabr 19). Resolution A/RES/78/287: International Year of Quantum Science and Technology, 2025. United Nations Digital Library. Retrieved July 23, 2025, from <https://docs.un.org/en/A/RES/78/287>

Sh. Mirziyoyev: "To achieve sustainable development, we must deeply master digital knowledge and information technologies, which allows us to take the shortest path to achieve comprehensive development. In today's world, digital technologies play a decisive role in all sectors."<sup>3</sup> International legal mechanisms regulating quantum technologies, post-quantum cryptography standards, foundations of interstate cooperation in the field of quantum computing, and taking into account their specific characteristics, requires deep study of issues related to the implementation of international legal norms on quantum technologies into national legislation and adaptation to contemporary global technological trends.

This dissertation research is based on the United Nations "Universal Declaration of Human Rights" of December 10, 1948, the "International Covenant on Economic, Social and Cultural Rights" of December 16, 1966, the "Budapest Convention on Cybercrime" of November 23, 2001, quantum communication and cryptography standards adopted by the International Telecommunication Union, as well as the laws of the Republic of Uzbekistan "On Informatization," "On Personal Data," "On Cybersecurity," the Decree of the President of the Republic of Uzbekistan No. PF-6079 of October 5, 2020 "On approval of the 'Digital Uzbekistan — 2030' strategy and measures for its effective implementation," the Resolution No. PQ-293 of August 15, 2024 "On additional measures for the development of education and science in the field of cryptology in the Republic of Uzbekistan," and other normative-legal documents related to scientific and technological innovations, cybersecurity, cryptographic information protection, data protection, and international scientific and technical cooperation. This research serves to fulfill the tasks established in these documents.

**Compliance of the Research with the Priority Areas of Scientific and Technological Development of the Republic.** The dissertation topic was conducted within the framework of the scientific research plan of Tashkent State University of Law titled "Formation of international legal foundations in the field of developing technologies, ensuring cybersecurity, and strengthening international cooperation in the field of digital and quantum law in the Republic of Uzbekistan."

**Degree of Study of the Problem.** The international legal aspects of the issues related to this research have not previously been examined as a separate object of comprehensive study. However, certain elements concerning the international legal regulation of quantum technologies have been addressed to some extent in the scientific works of scholars from our country, including S. Gulyamov, I. Rustambekov, S. Bozarov, A. Ubaydullayeva, and others. In particular, S. Gulyamov has paid special attention to this issue in his research, emphasizing that quantum technologies pose a threat to traditional cryptography and data protection systems, and highlighting the need to modernize them by introducing proactive and adaptive legal mechanisms [5].

Scholars from the Commonwealth of Independent States (CIS) countries—such as V. B. Naumov, G. V. Stankovsky, A. V. Minbaleev, A. A. Efremov, K. S.

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<sup>3</sup> "Shavkat Mirziyoyev Oliy Majlisga navbatdagi Murojaatnomani taqdim etadi" — 22-yanvar 2020. <https://president.uz/oz/lists/view/3309>

Evsikov, M. B. Dobrobaba, S. E. Channov, E. V. Kholodnaya, T. A. Polyakova, and others—have studied the international legal aspects of the issue. The information security dimensions of quantum technologies have also been examined by researchers such as V. B. Naumov, G. V. Stankovsky, K. S. Evsikov, A. A. Efremov, among others.

Foreign scholars such as Jack Beard, Melissa K. Griffith, Elsa B. Kania, Markus Wagner, Andrea Renda, and Sophie Duroffer have studied the legal regulation of quantum technologies from the perspective of international security and export control. In their research, they have placed particular emphasis on the regional mechanisms of international cooperation and the protection of human rights in the fight against quantum threats in this field.

However, the works of the aforementioned scholars are mainly devoted to the practical and normative aspects of quantum technologies, such as their impact on international security, export control, and strategic stability. Insufficient attention has been paid to the general theoretical foundations of their international legal regulation and the systematic analysis of international treaty-based legal mechanisms. Therefore, conducting a comprehensive study of this field from the perspective of international law is of urgent relevance, creating a need to examine, analyze, and improve the legal foundations of existing and emerging international treaties.

**Relevance of the Dissertation Research to the Research Plans of the Higher Education Institution Where the Dissertation Was Conducted.** The dissertation has been carried out within the framework of the research plan of Tashkent State University of Law under the theme: “Developing international legal frameworks for emerging technologies, ensuring cybersecurity, and strengthening international cooperation in the field of digital and quantum law in the Republic of Uzbekistan.”

**The aim of the research** is to identify existing conceptual, normative, and institutional problems related to the international legal regulation of quantum technologies, to analyze the evolutionary potential of international law in this field, and to develop legal proposals and recommendations for establishing the foundations of quantum law within the national legislation of Uzbekistan.

**Research Objectives:**

to conduct a legal analysis of the historical development of quantum technologies and the initial formation stages of the concept of quantum law in international law;

to define the formation of the concept of quantum law, its theoretical foundations, methodological approaches, and their role and significance in international law;

to clarify the core principles of quantum law (sovereignty, techno-security, dual-use control, etc.) and ways of their integration into international legal norms;

to analyze the institutional mechanisms of international organizations in the legal regulation of quantum technologies and identify their functional approaches;

to carry out a comparative legal analysis of regulatory practices and legal models for quantum technologies within regional organizations;

to examine mechanisms for joint regulation of quantum technologies through international cooperation formats (treaties, codes, declarations), and to develop approaches based on agreed principles;

to analyze Uzbekistan's state policy on quantum technologies, assess the current state of the legal infrastructure, and provide proposals for developing the normative foundations of quantum law;

to analyze Uzbekistan's potential for participation in international quantum legal cooperation, identify bilateral and multilateral diplomatic approaches, and propose mechanisms for legal dialogue;

to identify the challenges in implementing international quantum law norms into Uzbekistan's national legislation and to develop legal, organizational, and institutional recommendations for overcoming them.

**The object of the research** is the system of international legal relations related to the legal regulation of quantum technologies.

**The subject of the research** consists of international legal and national legislative norms related to the international legal regulation of quantum technologies, the regulatory practices of foreign states, the regulatory activities of international organizations, as well as the conceptual approaches and scientific-theoretical views existing in the field of legal science.

**Research Methods:** The dissertation employs methods such as analysis, synthesis, systematic approach, comparative legal analysis, historical method, formal-legal analysis, and the study of statistical data.

**Scientific Novelty of the Research** consists of the following:

a justification is provided for a document on security policy, including detailed risk assessment, as well as ensuring information security, cybersecurity, and the protection of users of payment services;

it is substantiated that credit institutions, payment organizations, payment system operators, currency exchanges, and credit bureaus should be issued binding instructions and regulatory documents to prevent and/or eliminate cybersecurity threats (including fraud involving bank cards);

the justification is given for measures aimed at reducing risks—such as fraud and illegal use of confidential and personal data—for the protection of payment service users;

it is substantiated that after the term “information protection,” the provision of “ensuring the information security and cybersecurity of information systems and resources” should be included;

in the legal system, the concept of "quantum law" has been developed as an author's definition: "a complex field of law that regulates the creation and application of quantum technologies, their transboundary circulation, and the social relations arising from them, evaluates the impact on traditional legal institutions (sovereignty, jurisdiction, law of evidence, information security), and encompasses new legal norms, principles, and mechanisms."

**Practical Results of the Research** are as follows:

a draft international convention titled “On the Creation and Use of Quantum Technologies and Systems” has been developed to enhance international legal cooperation in the field of quantum technologies;

a mechanism for integrating the powers of supervisory authorities in the implementation of international cooperation for the prevention of and response to violations in the field of quantum technologies has been designed;

a model of a unified international platform for interstate information exchange in the implementation of quantum cryptography and quantum communication systems has been developed;

the conceptual foundations of international legal cooperation in the field of quantum technologies have been developed and introduced into practice;

model templates of regional legal instruments aimed at fostering international cooperation in the field of quantum technologies have been created;

the legal foundations for an international audit system to ensure security in the field of quantum technologies have been established.

**Reliability of the Research Results.** The research results are based on the generalization of national legal norms, the experiences of developed countries, law enforcement practices, and the analysis of statistical data, and have been formalized with relevant documentation. The conclusions, proposals, and recommendations have undergone approbation, and their results have been published in leading national and international journals. The obtained outcomes have been implemented in practice.

**Scientific and Practical Significance of the Research Results.** The scientific significance of the research lies in the potential use of its theoretical conclusions, proposals, and recommendations in future academic studies, law-making activities, legal practice, the work of authorized state bodies responsible for providing legal assistance in criminal matters, in the interpretation of relevant norms of criminal procedural legislation, in the improvement of national legislation, as well as in the enrichment of academic disciplines such as “Public International Law,” “International Human Rights Law,” and “Economic Criminal Law.” Relying on the theoretical foundations of the research creates a basis for conducting new scientific inquiries related to the international legal regulation of quantum technologies, for improving international treaty-based and institutional mechanisms in the field of quantum technology, and for developing practical proposals for implementing international legal norms into national legislation.

The practical significance of the research results is reflected in their applicability to the improvement of international and national legal instruments regulating quantum technologies, the advancement of law enforcement practices, the inventory and review of existing international legal documents related to quantum technologies, and the development of legislative acts aimed at enhancing the regulatory and oversight activities of international organizations and authorized state bodies operating in this field.

### **Implementation of Research Results.**

The research results have been applied in the following areas:

the proposal concerning a security policy document that includes detailed risk assessments, as well as ensuring information security, cybersecurity, and the protection of users of payment services, was used in the development of the ninth paragraph of part two of Article 24 of the Law of the Republic of Uzbekistan "On Payments and Payment Systems" No. LRU-578 (recorded in Protocol No. 23 dated October 2, 2024, of the Senate Committee on Judicial-Legal Issues and Anti-Corruption of the Oliy Majlis of the Republic of Uzbekistan). Implementation of this proposal has contributed to strengthening the regulation of quantum technology security aspects in payment services and improving legal protection mechanisms against modern threats;

the proposal to grant credit institutions, payment organizations, payment system operators, currency exchanges, and credit bureaus the authority to issue binding instructions and adopt regulatory documents to prevent and/or eliminate cybersecurity threats (including fraud involving bank cards) was used in the development of part one of Article 12 of the Law "On the Central Bank of the Republic of Uzbekistan" No. 154-I (Protocol No. 24 dated November 1, 2024, of the same Senate Committee). This implementation granted the Central Bank the authority to issue mandatory cybersecurity instructions to financial sector entities and introduced oversight mechanisms, enhancing the system for addressing threats associated with quantum technologies;

the proposal describing measures to reduce risks, including fraud and illegal use of confidential and personal data, to protect users of payment services, was incorporated into the development of the eleventh paragraph of part three of Article 22 of the Law "On Payments and Payment Systems" No. LRU-578 (Protocol No. 23 dated November 1, 2024, of the same Senate Committee). The implementation of this proposal strengthened mechanisms for protecting users' confidential data against fraud and illegal interference using quantum technologies, thus enhancing the security system;

the proposal to include "ensuring the information security and cybersecurity of information systems and resources" after the term "information protection" was used in the development of the second paragraph of Article 4 and the second paragraph of Article 5 of the Law "On the Protection of Information in Automated Banking Systems" No. LRU-30, adopted on April 4, 2006 (Protocol No. 23 dated October 2, 2024, of the same Senate Committee). Implementation of this proposal reinforced measures to protect information security in automated banking systems against new threats posed by quantum technologies, thereby improving the cybersecurity level of the banking sector;

the author's definition of the concept of "quantum law" has been incorporated into the content of the "Quantum Law" textbook (Certificate of Tashkent State University of Law dated September 15, 2025).

**Approbation of the Research Results.** The results of this research have been presented and discussed at 5 scientific conferences, including 3 international and 2 national scientific-practical conferences.

**Publication of the Research Results.** A total of 18 scientific works have been published on the dissertation topic, including 13 scientific articles in journals recommended by the Higher Attestation Commission under the Ministry of Higher Education, Science and Innovation of the Republic of Uzbekistan for publishing main results of doctoral dissertations (5 of which were published in foreign journals).

**Structure and Volume of the Dissertation.** The dissertation consists of an introduction, three chapters, a conclusion, a list of references, and appendices. The total volume of the dissertation is 148 pages.

## MAIN CONTENT OF THE DISSERTATION

The introduction of the dissertation presents the relevance and necessity of the research topic, its alignment with the key priority areas of scientific and technological development of the Republic, the degree of study of the researched problem, the connection of the dissertation topic with the research plans of the higher education institution where the dissertation is being conducted, the research objectives and tasks, object and subject, methods, scientific novelty and practical results of the study, the reliability of the findings, the scientific and practical significance of the research outcomes, their implementation, approbation of the results, publication of the findings, as well as the structure and volume of the dissertation.

In the first chapter of the dissertation, titled "**Theoretical foundations of quantum law in international law**" the historical development of quantum technologies, the formation of the concept of quantum law within the international legal system, its theoretical and methodological foundations, as well as the main principles and characteristics related to the governance of quantum law under international law are examined. Additionally, the chapter analyzes the impact of quantum technologies on international law, the adequacy of existing legal instruments, and the necessity of developing new legal mechanisms tailored to the unique features of quantum technologies.

In particular, the first paragraph titled "*History of Quantum Technologies and the Initial Formation of Quantum Law in International Law*" discusses the stages of development of quantum technologies and the new challenges these technologies pose for international law. It also addresses the adaptability of the existing international legal system to these technologies, as well as the necessity for introducing a new concept of "quantum law."

The dissertation author defines the advantages of considering the international legal regulation of quantum technologies as a separate legal field as follows: Firstly, the global scope of quantum technologies cannot be fully covered through traditional legal approaches, and the need for new regulatory mechanisms arises in their governance; Secondly, unique features specific to quantum technologies such as "non-locality," "entanglement," and "superposition" are not encompassed within the existing international legal system, and the development of special principles and rules for them is required; Thirdly, the rapid development of quantum technologies

and the necessity of anticipating their impact on global security generate the need for creating a new legal direction before the international community.

As a result of the analysis, the doctoral candidate emphasizes that there are no universal international treaties regulating quantum technologies under international law and notes that international legal documents related to quantum technologies have mainly been developed by regional organizations. According to the candidate, the lack of unified standards for concepts and mechanisms related to quantum technologies at the international level may lead to legal uncertainty and disputes in the field of international law in the future. Therefore, the author puts forward the necessity of developing unified international standards for legal concepts and principles related to quantum technologies.

The second paragraph of the first chapter is titled “The Concept and Theoretical-Methodological Foundations of Quantum Law” and provides an in-depth analysis of the place of quantum law within the framework of international law, as well as the theoretical and methodological foundations necessary for the formation of this new field. The researcher emphasizes the need to consider not only the existing general principles of international law but also the specific characteristics of quantum physics when shaping the theoretical and methodological bases of quantum law. The study offers a detailed examination of scholarly opinions on whether quantum law should be distinguished as a separate branch of international law or integrated into the existing system, and the doctoral candidate presents their own authorial position on the matter.

The third paragraph of the first chapter is titled “Basic Principles and Characteristics of Quantum Law” and analyzes the principles that serve as the basis for regulating quantum technologies from the perspective of international law. Among these, the key principles examined include quantum sovereignty, peaceful use, shared responsibility, interoperability, and equitable access.

At the end of the paragraph, the doctoral candidate emphasizes that no unified international legal instruments based on these principles have been developed by the international community and concludes that, for the effective implementation of quantum law in the future, it is necessary to harmonize international and national legislation and strengthen the international legal foundations in this area.

The second chapter of the dissertation, titled “**International mechanisms of interstate cooperation in the field of quantum law**” examines the international organizations, regional structures, and intergovernmental cooperation mechanisms involved in the international legal regulation of quantum technologies, along with an assessment of their effectiveness. In addition, the role of international organizations in the formation of quantum law, the experiences of regional organizations in this regard, and the legal foundations of bilateral cooperation between states are analyzed.

In particular, the first paragraph titled “Institutional foundations for regulating quantum law at the international level” addresses the role, capabilities, and limitations of existing international institutions in the regulation of quantum technologies, as well as the necessity of either enhancing these institutions or creating new mechanisms in the future.

The doctoral candidate emphasizes that there is no single universal international document in the field of quantum law adopted by international organizations, and that activities related to quantum technologies are currently limited to technical standards or norms established by organizations such as the United Nations (UN), the International Telecommunication Union (ITU), and the World Intellectual Property Organization (WIPO). The author concludes that, in order to effectively regulate quantum technologies, it is necessary to develop a dedicated legal institution or an international treaty at the global level.

The second paragraph of the second chapter, titled “Foundations for regulating quantum law within regional organizations” provides an in-depth analysis of the experiences of regional organizations in regulating quantum technologies. The researcher examines the European Union’s “Quantum Flagship” program and the experience of other regional organizations in developing strategic documents and standards related to quantum technologies. Based on the analysis, it is concluded that regional organizations play a significant role in strengthening international cooperation on quantum technologies, and their legal practices can be applied at the global level.

The third paragraph of the second chapter, titled “International cooperation mechanisms in the field of quantum law” analyzes the existing forms of cooperation between states regarding the regulation of quantum technologies. The author studies bilateral and multilateral cooperation formats and categorizes international cooperation mechanisms in the field of quantum technologies into the following areas: exchanging information on quantum technologies and related risks; supporting research on quantum technologies; controlling the spread of quantum technologies; detecting and responding to illegal quantum systems; conducting investigations related to incidents involving quantum technologies; collecting evidence; and enforcing legal regulations pertaining to quantum technologies.

The researcher substantiates the need to enhance international treaties and intergovernmental agreements, develop new international legal standards, and adapt the implementation of existing treaties to national legislation in order to make international cooperation mechanisms in the field of quantum technologies more effective.

At the end of the paragraph, the doctoral candidate concludes that it is necessary to develop international cooperation related to quantum technologies on the basis of international instruments ratified by the Republic of Uzbekistan and emphasizes that implementing international standards into national legislation can help prevent risks associated with quantum technologies and protect the country’s interests.

The third chapter of the dissertation, titled “Formation of the Quantum Law Concept in the Republic of Uzbekistan” explores state policy on quantum technologies in Uzbekistan, the prospects for developing quantum law in the country, available opportunities for international cooperation, and issues related to the implementation of international standards into national legislation. In addition, the chapter provides a thorough analysis of existing legislative gaps in the legal

regulation of quantum technologies, the necessity of addressing these gaps, and the possibilities for aligning national legislation with international quantum standards.

In particular, the first paragraph titled “State policy on quantum technologies in Uzbekistan and the creation of quantum law foundations” outlines the measures, strategies, and legal initiatives undertaken by the state to develop quantum technologies and regulate them from a legal perspective in Uzbekistan.

The doctoral candidate notes that there is no specific legal framework for regulating quantum technologies in the Republic of Uzbekistan; however, this field is indirectly regulated through general laws and normative acts present in the national legislation. At the same time, the author concludes that it is necessary to establish a dedicated legal framework for quantum technologies, study international experiences in this area, and adapt them to the national legal system.

The second paragraph of the third chapter, titled “Uzbekistan’s opportunities and prospects for international cooperation in the field of quantum law” provides an in-depth analysis of the Republic of Uzbekistan’s potential for engaging in international cooperation in the area of quantum law, as well as the country’s geopolitical position and its diplomatic and legal capacities. The researcher substantiates that Uzbekistan has opportunities to develop cooperation with leading countries in quantum technologies such as the European Union, the United States, China, and India. It is also argued that collaboration with regional organizations and international institutions could help align national quantum legislation with international standards. At the end of the paragraph, it is emphasized that Uzbekistan’s active participation in the global quantum community would enable the country to secure its place in international legal initiatives concerning the use and regulation of quantum technologies.

The third paragraph of the third chapter, titled “Issues of implementing international quantum law standards into Uzbekistan’s legislation” analyzes the possibilities of incorporating international legal standards related to quantum technologies into national legislation, as well as the existing challenges and potential solutions in this process. The author emphasizes the necessity of ratifying international treaties and addressing existing gaps in national legislation to ensure effective implementation of international legal standards. The doctoral candidate substantiates that the development of specific legislative acts regulating quantum technologies in Uzbekistan, along with the gradual incorporation of international standards into domestic legislation, can eliminate legal uncertainties and establish a coherent regulatory framework.

At the end of the paragraph, the doctoral candidate emphasizes that by implementing international quantum law standards into the national legislation of the Republic of Uzbekistan, favorable conditions will be created for effectively protecting the country’s interests at the international level, preventing risks associated with quantum technologies, and strengthening the state’s reputation on the global stage.

## CONCLUSION

It is advisable to formulate the proposals and recommendations developed on the basis of the scientific research—dedicated to the comprehensive study and analysis of improving international cooperation in the field of quantum law and ensuring the national interests of the Republic of Uzbekistan—into the following three directions:

**The first direction – on the development of theoretical provisions related to international and national quantum law, the following scientific and theoretical conclusions have been reached:**

1. Although various approaches to the legal regulation of quantum technologies exist around the world, a unified concept or general definition has not yet been fully formed. In this regard, taking into account the unique characteristics of quantum technologies (entanglement, superposition, uncertainty), the following authorial definition of the term “Quantum Law” has been developed in the research: *Quantum law is a complex field of law that regulates the creation and application of quantum technologies, their transboundary circulation, and the social relations arising from them; it assesses their impact on traditional legal institutions (sovereignty, jurisdiction, law of evidence, information security), and encompasses new legal norms, principles, and mechanisms.*

2. Due to the fact that quantum technologies are bringing state control over digital infrastructure and databases to a new level, there is a growing need in international law for the concept of “Quantum Sovereignty.” The following authorial definition of this concept has been developed: *Quantum sovereignty is the absolute right of a state to independently regulate, control, and protect its quantum infrastructure, quantum data flows, and quantum communication channels within its territory in order to ensure its national interests, security, and economic stability.*

3. Defining the core principles of quantum law is of vital importance for establishing an effective regulatory system. In the dissertation, the following are proposed as the fundamental principles of quantum law:

**General legal principles:** legality, respect for human rights, faithful fulfillment of international obligations, and respect for state sovereignty.

**Special principles:** peaceful use of quantum technologies; transparency and accountability; shared responsibility (especially in entangled quantum systems); global technical interoperability; equitable access to the benefits of quantum technologies and prevention of the “quantum divide.”

4. Since quantum data possesses fundamentally different characteristics from traditional digital data (quantum entanglement, superposition state), a special legal regime must be applied to them. This creates a need for the concept of “Legal Regime of Quantum Data.” The following author's definition was given to this concept: *The Legal Regime of Quantum Data is a system of special legal norms and mechanisms that regulates the processes of creation, storage, transmission, modification, and destruction of information in quantum states, and ensures the confidentiality, integrity, and availability of data, taking into account the characteristics of quantum cryptography and quantum teleportation.*

5. Based on the UN Charter, international humanitarian law, and human rights norms, it is necessary to form a new system of international legal obligations for states in the use of quantum technologies, and this creates a need for the concept of "International Obligations of States in the Use of Quantum Technologies." Accordingly, an author's definition was developed for this concept: *International Obligations of States in the Use of Quantum Technologies is a complex of erga omnes (obligations to all states) obligations of states to restrict the quantum arms race, refrain from quantum cyberattacks (the principle of distinction in international humanitarian law), and respect personal privacy in quantum surveillance systems.*

**The second direction – a number of proposals have been developed aimed at improving the legal framework for international cooperation in the field of quantum law:**

6. Currently, international relations in the field of quantum technologies are mainly regulated through bilateral agreements and fragmented "soft law" norms. In order to eliminate these legal gaps and establish global standards, it is proposed to develop and adopt a universal convention under the auspices of the United Nations titled "On the Creation, Use, and Distribution of Quantum Technologies." This convention should include definitions of quantum technologies, guarantees for their peaceful use, obligations to transition to post-quantum cryptography, commitments not to develop or proliferate quantum weapons, as well as provisions on technology transfer for developing countries.

7. During the process of adopting the United Nations' new convention on "On the Creation, Use, and Distribution of Quantum Technologies" a separate chapter should be included addressing countermeasures against cyberattacks that could be carried out using quantum computers. This chapter should envisage the mandatory implementation of quantum-resistant encryption standards, strengthening international cooperation in investigating cybercrimes, involving quantum technology experts in this process, and creating a unified interstate information exchange platform.

8. Adapting existing international treaties to the requirements of the quantum era. In particular, considering that quantum computers have been added to the list under the Wassenaar Arrangement on the control of exports of dual-use goods and technologies, it is proposed to expand the scope of the arrangement by including quantum sensors, quantum radar systems, and specialized quantum algorithms.

9. Establishing the Global Quantum Governance Framework at the international level. This structure, based on legal (conventions), technical (standards), and equity (support for developing countries) pillars, could serve as a coordinating center for the activities of organizations such as the United Nations (UN), International Telecommunication Union (ITU), International Organization for Standardization (ISO), and World Intellectual Property Organization (WIPO).

10. Development and adoption at the international level of an "International Protocol on Standardization and Certification of Quantum Technologies." Within the framework of this protocol, mechanisms should be implemented for assessing the security levels of quantum devices (quantum security certificate), verifying the reliability of quantum algorithms, and confirming the robustness of quantum

cryptographic protocols. Taking into account the transboundary nature of quantum technologies and the principle of technical interoperability, unified international standards are necessary to ensure mutual compatibility and security of quantum systems being developed in various countries.

11. Based on the concept of quantum sovereignty and the principle of transparency presented in the dissertation, it is necessary to create a system to monitor states' compliance with international obligations regarding the use of quantum technologies. The proposed "International Center for Quantum Technologies Monitoring and Compliance" should perform the functions of receiving annual reports from states on the development of quantum infrastructure, monitoring activities in the field of quantum armament, monitoring the transition to post-quantum cryptography, and verifying guarantees of peaceful use of quantum technologies. Based on the principle of preventing "quantum divide" emphasized in the dissertation, the Center should also perform tasks of providing technical assistance to developing countries in implementing quantum technologies, harmonizing programs for training quantum specialists, and forming a collection of best practices in the field of quantum technologies. According to the results of monitoring, the Center is envisaged to submit an annual report to the UN General Assembly and develop recommendations on emerging legal issues in the field of quantum technologies.

**The third direction – the following recommendations have been developed for the implementation of international quantum law standards and the improvement of national legislation in the Republic of Uzbekistan:**

12. Establish an interagency council on quantum technologies composed of representatives from the Ministry of Digital Technologies, Ministry of Justice, Ministry of Higher Education, Science and Innovation, the State Security Service, and the Office of the Prosecutor General of the Republic of Uzbekistan. The primary function of the council will be to develop the draft of the unified state policy titled "Uzbekistan's National Quantum Strategy" and to coordinate the process of implementing international standards into national legislation.

13. It is advisable to supplement the Law of the Republic of Uzbekistan "On Informatization" with the following new article:

**Article 6<sup>1</sup>. State Policy and Legal Regulation Foundations in the Field of Quantum Technologies**

The state policy in the field of quantum technologies in the Republic of Uzbekistan is aimed at ensuring national security, promoting innovative development, and integrating with international standards.

State bodies and subjects of critical information infrastructure are required to transition to post-quantum cryptography standards within the timelines and procedures established by the authorized state body to protect their information systems and databases from threats posed by quantum computers.

Critical quantum infrastructure serving the national interests of the Republic of Uzbekistan (quantum communication networks, quantum sensor systems) must

remain under national jurisdiction, and their activities are subject to state control (quantum sovereignty).

Coordination of activities in the field of quantum technologies, improvement of the regulatory and legal framework, and development of international cooperation shall be carried out by the authorized Interagency Council.

14. It is proposed that Part Two of Article 8 of the Law of the Republic of Uzbekistan "On Electronic Digital Signature" be supplemented with new wording as follows:

"It is deemed expedient to approve a list of cryptographic algorithms and protocols mandatory for the use of electronic digital signatures, and to regularly update this list taking into account modern threats and international standards, including post-quantum cryptography (quantum-resistant) standards;"

This change may impose on the Ministry of Digital Technologies the obligation to timely implement quantum-resistant encryption standards for all electronic digital signatures used in state and civil-legal relations.

15. It is proposed that Part Two of Article 21 of the Law of the Republic of Uzbekistan "On Payments and Payment Systems" be supplemented with new wording as follows:

"Approval of a list of cryptographic protection tools mandatory for use by payment systems operators and payment service providers, and regular updating of it in accordance with international post-quantum cryptography standards;"

This proposal may give the Central Bank specific authority to establish quantum-resistant encryption standards necessary to protect the country's financial system, including banking operations and payment infrastructure, from cyberattacks that may be carried out using quantum computers, and to monitor the transition to these standards.

16. It is recommended to strengthen regional cooperation in Central Asia in the field of quantum technologies. In particular, Uzbekistan may initiate the development of a regional quantum security framework, joint standards, and collaborative research platforms with neighboring states. Such cooperation would enhance regional resilience, promote the safe use of quantum technologies, and increase the practical significance of national legislative reforms.

**НАУЧНЫЙ СОВЕТ DSc.07/03.06.2023.Yu.22.04 ПО ПРИСУЖДЕНИЮ  
УЧЁНЫХ СТЕПЕНЕЙ ПРИ ТАШКЕНТСКОМ ГОСУДАРСТВЕННОМ  
ЮРИДИЧЕСКОМ УНИВЕРСИТЕТЕ**

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**ТАШКЕНТСКИЙ ГОСУДАРСТВЕННЫЙ ЮРИДИЧЕСКИЙ  
УНИВЕРСИТЕТ**

**АБДИХАКИМОВ ИСЛОМБЕК БАХОДИР ОГЛИ**

**ПЕРСПЕКТИВЫ РАЗВИТИЯ КВАНТОВОГО ПРАВА  
В УЗБЕКИСТАНЕ**

**12.00.10 – Международное право**

**АВТОРЕФЕРАТ**  
диссертации доктора философии (PhD) по юридическим наукам

**Ташкент – 2025**

Тема диссертации доктора философии (PhD) зарегистрирована Высшей аттестационной комиссией при Министерстве высшего образования, науки и инноваций под номером B2025.1.PhD/Yu1838.

Диссертация выполнена в Ташкентском государственном юридическом университете.

Автореферат диссертации размещен на трёх языках (узбекском, английском, русском (резюме)) на веб-странице научного совета (<https://tsul.uz/uz/fan/avtoreferatlar>) и Информационно-образовательном портале «ZiyoNet» ([www.ziynet.uz](http://www.ziynet.uz)).

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**Институт парламентских исследований при  
Законодательной палате Олий Мажлиса  
Республики Узбекистан**

Защита диссертации состоится 8 ноября 2025 года в 11:00 часов на заседании Научного совета DSc.07/03.06.2023.Yu.22.04 при Ташкентском государственном юридическом университете (Адрес: 100047, г. Ташкент, ул. Сайилгох, 35. Тел.: +998 71 233-66-36; факс: +998 71 233-37-48, e-mail: [info@tsul.uz](mailto:info@tsul.uz)).

С диссертацией можно ознакомиться в Информационно-ресурсном центре Ташкентского государственного юридического университета (зарегистрирована за № 1438). (Адрес: 100047, г.Ташкент, ул. А.Темура, 13. Тел.: +998 71-233-66-36.

Автореферат диссертации разослан 23 октября 2025 года.

(протокол реестра № 12 от 23 октября 2025 года).



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## **Введение (аннотация к диссертации доктора философии (PhD))**

**Целью исследования** является выявление существующих концептуальных, нормативных и институциональных проблем, связанных с международно-правовым регулированием квантовых технологий, анализ эволюционных возможностей международного права в данной сфере, а также разработка правовых предложений и рекомендаций по формированию основ квантового права в национальном законодательстве Республики Узбекистан.

**Объектом исследования** является система международно-правовых отношений, связанных с правовым регулированием квантовых технологий.

**Научная новизна исследования** проявляется в следующем:

обоснована необходимость документа по политике безопасности, включающего в себя детальную оценку рисков, а также направленного на обеспечение информационной и кибербезопасности и защиту пользователей платёжных услуг;

обоснована возможность предоставления обязательных к исполнению указаний и принятия нормативных актов в целях предотвращения и (или) устранения угроз кибербезопасности (в том числе хищений, связанных с банковскими картами) для кредитных организаций, платёжных организаций, операторов платёжных систем, валютных бирж и кредитных бюро;

обоснованы меры по снижению рисков для защиты пользователей платёжных услуг, в том числе в части мошенничества и незаконного использования конфиденциальной и персональной информации;

после слов «защита информации» обосновано добавление положения о необходимости обеспечения информационной и кибербезопасности информационных систем и ресурсов;

в правовой системе разработано авторское определение концепции "квантовое право": "комплексная отрасль права, которая регулирует создание и применение квантовых технологий, их трансграничный оборот и возникающие из них общественные отношения, оценивает влияние на традиционные правовые институты (суверенитет, юрисдикция, доказательственное право, информационная безопасность) и включает в себя новые правовые нормы, принципы и механизмы."

**Внедрение результатов исследования.** Результаты исследования использованы в следующих:

Предложение, касающееся политики безопасности, включая документ с детальной оценкой рисков, а также направленное на обеспечение информационной и кибербезопасности и защиту пользователей платёжных услуг, было использовано при разработке девятого абзаца второй части 24-й статьи Закона Республики Узбекистан «О платёжах и платёжных системах» № ЗРУ-578 (Протокол № 23 Комитета Сената Олий Мажлиса Республики Узбекистан по судебным-правовым вопросам и противодействию коррупции от 2 октября 2024 года). Реализация данного предложения направлена на усиление регулирования вопросов безопасности квантовых технологий в платёжных

услугах и совершенствование правовых механизмов защиты от современных угроз.

Предложение о предоставлении полномочий по выдаче обязательных к исполнению указаний и принятию нормативных актов, направленных на предотвращение и (или) устранение угроз кибербезопасности (в том числе связанных с хищениями посредством банковских карт) для кредитных организаций, платёжных учреждений, операторов платёжных систем, валютных бирж и кредитных бюро, было использовано при разработке первой части статьи 12 Закона Республики Узбекистан «О Центральном банке Республики Узбекистан» № 154-I (протокол № 24 Комитета Сената Олий Мажлиса Республики Узбекистан по судебным-правовым вопросам и противодействию коррупции от 1 ноября 2024 года). Реализация данного предложения предоставила Центральному банку полномочия по выдаче обязательных предписаний субъектам финансового сектора в целях обеспечения кибербезопасности и внедрения контрольных механизмов, тем самым способствуя совершенствованию системы противодействия угрозам, связанным с квантовыми технологиями.

Предложение, касающееся описания мер по снижению рисков для обеспечения защиты пользователей платёжных услуг, включая угрозы мошенничества, а также незаконного использования конфиденциальной и персональной информации, было использовано при разработке одиннадцатого абзаца третьей части статьи 22 Закона Республики Узбекистан «О платёжах и платёжных системах» № ЗРУ-578 (протокол № 23 Комитета Сената Олий Мажлиса Республики Узбекистан по судебным-правовым вопросам и противодействию коррупции от 1 ноября 2024 года). Реализация данного предложения способствовала совершенствованию механизмов защиты конфиденциальной информации пользователей платёжных услуг от мошенничества и незаконных вмешательств с применением квантовых технологий, усилив тем самым систему безопасности.

Предложение о включении после слов «защита информации» формулировки «обеспечение информационной и кибербезопасности информационных систем и ресурсов» было использовано при разработке второго абзаца статьи 4 и второго абзаца статьи 5 Закона Республики Узбекистан «О защите информации в автоматизированной банковской системе» № ЗРУ-30, принятого 4 апреля 2006 года (протокол № 23 Комитета Сената Олий Мажлиса Республики Узбекистан по судебным-правовым вопросам и противодействию коррупции от 2 октября 2024 года). Реализация данного предложения способствовала усилению мер по обеспечению информационной безопасности в автоматизированных банковских системах, укрепляя защиту от угроз, связанных с новыми квантовыми технологиями, и повышая уровень кибербезопасности банковской системы.

авторское определение концепции "квантовое право" включено в содержание учебника "Квантовое право" (Свидетельство Ташкентского государственного университета права от 15 сентября 2025 года).

**Структура и объем диссертации.** Диссертация состоит из введения, трех глав, заключения, списка использованной литературы и приложения. Объем диссертации составляет 148 страницы.

**E'LON QILINGAN ISHLAR RO'YXATI**  
**SPISOK OPUBLIKOVANNYX RABOT**  
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**I bo'lim (I chast; I part)**

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