Institute of Theoretical Physics,
Chinese Academy of Sciences,
Beijing, China

July, 2025

NSFC report
Excellent Youth (Overseas) Program

Oleksandr (Sasha) Tomalak

tomalak7.github.io

Education

2012–2016 **Ph.D. in Theoretical Physics**, Johannes Gutenberg-Universität Mainz, Mainz, Germany, *Summa Cum Laude*.

2010–2012 **MS in Theoretical Physics**, Taras Shevchenko National University, Kyiv, Ukraine, *Red Diploma*.
Speciality: Nuclear and Particle Physics, Quantum Field Theory

2006–2010 **BS in Physics**, Taras Shevchenko National University, Kyiv, Ukraine, *Red Diploma*.
Speciality: Nuclear and Particle Physics, Quantum Field Theory

Experience

Research in Particle, Hadron, Nuclear, and Neutrino Physics, Analytical Computations, Problem Solving, Programming, Data Analysis.

- Advanced Research in Neutrino, Hadron, and Nuclear Physics resulting in collaborative grants, mentoring and communication skills as

2021–2024 **Director's Postdoctoral Fellow**, Los Alamos National Laboratory, NM, USA.

- Bringing Radiative Corrections and Modern Nucleon Structure to Neutrino Physics, mentoring and communication skills as

2018–2021 **Postdoctoral researcher**, University of Kentucky, Lexington, KY, USA and Fermilab, Batavia, IL, USA.

- Theory of Atomic Physics and Lepton Scattering, mentoring skills as

2016–2018 **Postdoctoral researcher**, Johannes Gutenberg-Universität Mainz, Mainz, Germany.

- Precise Nucleon Structure, teaching and communication skills as

2012–2016 **Ph.D. student**, Johannes Gutenberg-Universität Mainz, Mainz, Germany.

- Analytical and Numerical Calculations in Early Universe Cosmology as

2012–2015 **Ph.D. student**, Taras Shevchenko National University, Kyiv, Ukraine.

- Programming and advanced communication skills as

2015–2017 **Guest scientist**, Department of Physics, University of Pavia, Pavia, Italy.

- Data analysis, detector monitoring, and data taking as

2010–2011 **Member of D0 Collaboration**, D0 Experiment, Fermilab, Batavia, IL, USA.

- Calibration of detectors in high-energy physics experiment as

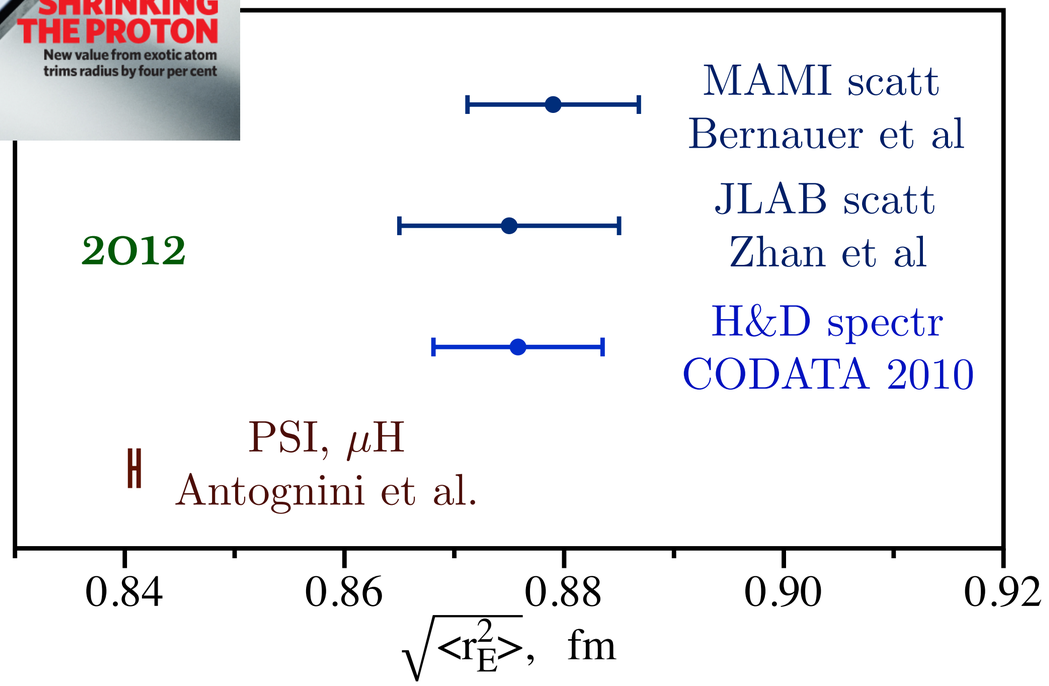
2009–2010 **Bachelor student**, ZEUS Experiment, DESY, Hamburg, Germany.

Proton Radius Puzzle

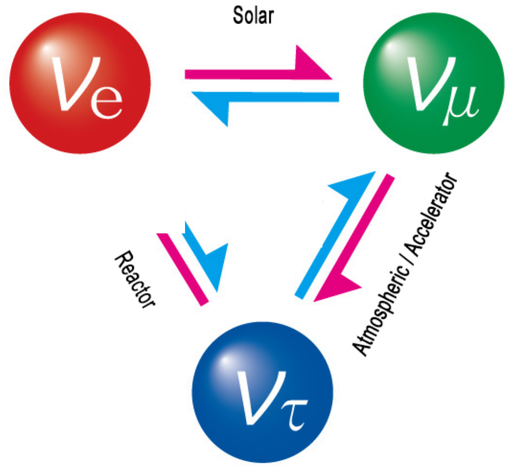
μH Lamb shift

proton size discrepancy

eH, ep vs μH: 5-6σ

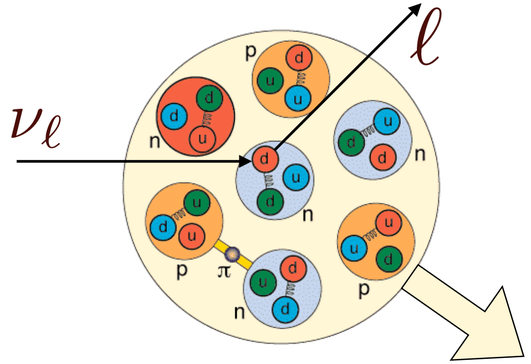


Precise Neutrino Physics



neutrino mass hierarchy

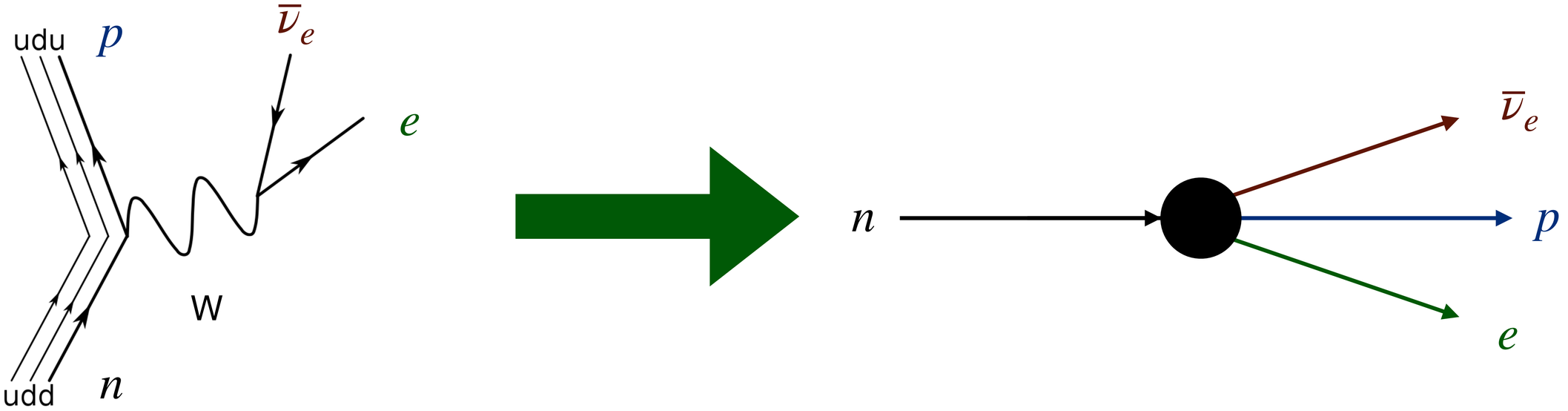
CP violation in lepton sector



- intersection of particle, hadron, nuclear, and atomic physics
- radiative corrections and nucleon structure are crucial

Neutron decay

- neutron is heavier than proton by 1.3 MeV



- most precise neutron lifetime with new effective field theory approach

Standard Model -> LEFT-> HBχPT -> πEFT

- intersection of particle, hadron, nuclear, and atomic physics
- radiative corrections and nucleon structure are crucial

Publication and citation summary

number of papers	papers in Coll.	one author	review articles	letters	letters in Coll.	Nature Commun.	number of citations	h-index
69	15	14	2	9	4	1	2222	28

from Google Scholar

Talks and community service

invited talks	contributed talks	journals with referee service	co-mentoring	research proposals	funded proposals
48	102	16	6	10	6

Major academic achievements

1) neutrino cross sections for oscillation experiments

2) coherent elastic neutrino-nucleus scattering

3) neutron decay and Cabibbo-Kobayashi-Maskawa mixing

4) nucleon form factors

5) precision physics of simple atoms

6) nucleon and nuclear structure in large nuclei

Full-time work plan

1) neutrino cross sections for oscillation experiments — JUNO

2) coherent elastic neutrino-nucleus scattering

reactors

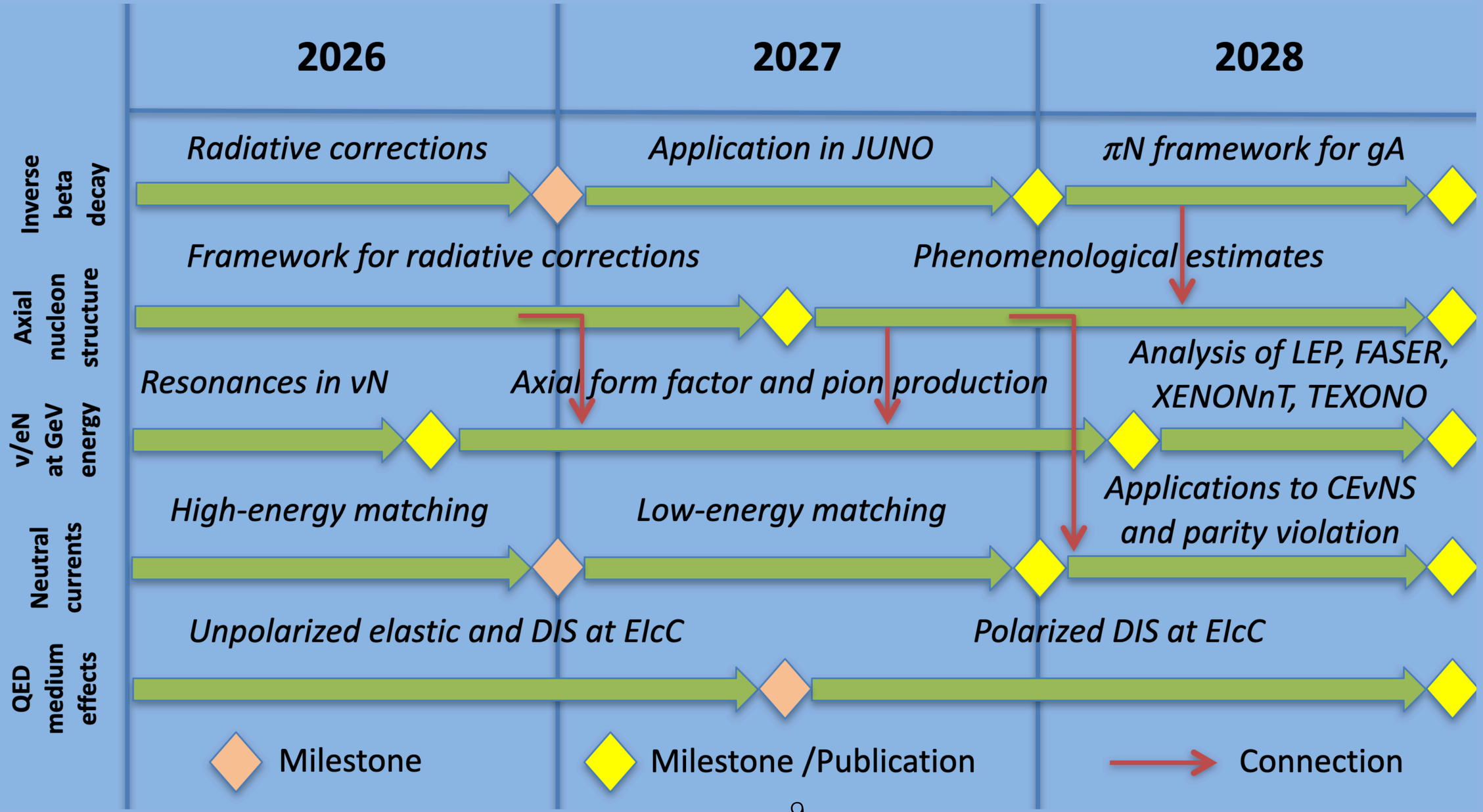
3) neutrino electromagnetic properties

4) nucleon form factors — neutrinos&electrons

5) atomic parity violation and parity-violating electron scattering

6) nucleon and nuclear structure in large nuclei — EICC

Full-time work plan



Employer support

- O.T. appointed as a tenure-track Associate Professor from 15/07/2025 at Institute of Theoretical Physics, Chinese Academy of Sciences, Beijing

- ITP@CAS offers a competitive salary, dedicated office space, support in establishing a research team, and assistance with housing

- O.T. dedicates the majority of his working time to advancing his research initiatives under the Excellent Youth (Overseas) Project

Thanks for your attention !!!