Research and Daily life in Quy Nhon

Phan To Quyen

Vietnam neutrino group
IFIRSE - ICISE

VSON8, 15 – 26 July, 2024

About me

- Full name: Phan To Quyen
- Hometown: Binh Dinh province
- 2nd year PhD student at GUST, VAST.

2022 - present

2015 - 2019

Bachelor: Physics Teacher at Quy Nhon University

2019 - 2022

Master: Theoretical and Mathematical Physics at GUST, VAST.

PhD student in Theoretical and Mathematical Physics, at GUST, VAST

Member of VN neutrino group, IFRISE, ICISE.

T2K collaborator since 2019

My hometown

Sea

Martial art

Binh Dinh province

Food

ancient architecture (ChamPa)

Research at IFIRSE

- Simons Astrophysics group (SAGI)
- Environment group
- Neutrino physics group

Neutrino lab

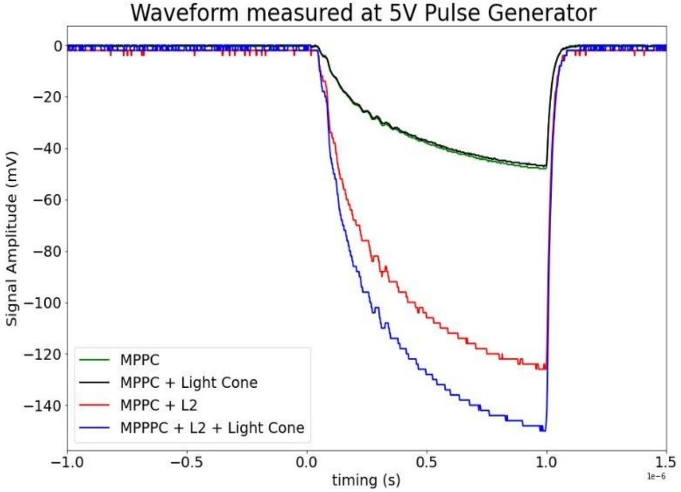
Group meeting room

Research at IFIRSE

❖ Hardware work at IFIRSE:

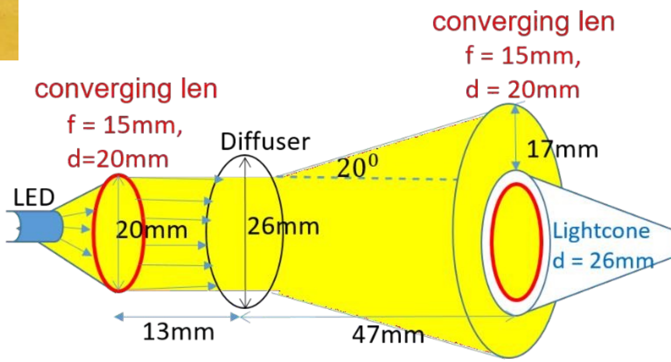
- MPPC and some equipments at the neutrino lab.
- Data readout and analysis
- *Develop the light cone for SiPM photosensor*

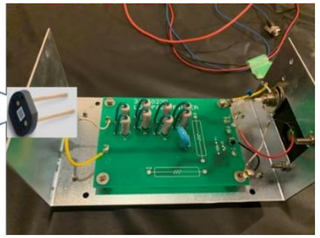
PMT



Initial result

MPPC



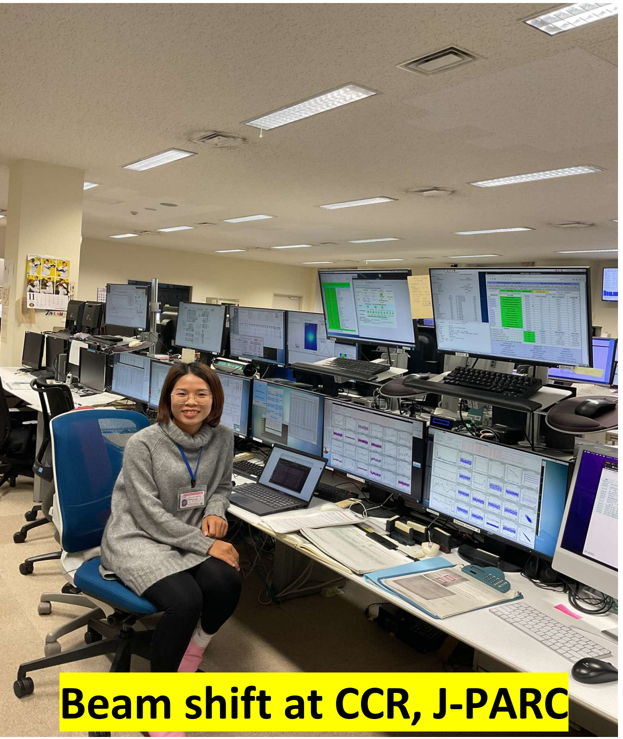


Research at IFIRSE

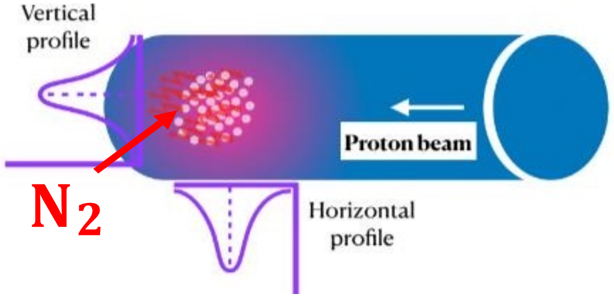
❖ Hardware work at J-PARC:

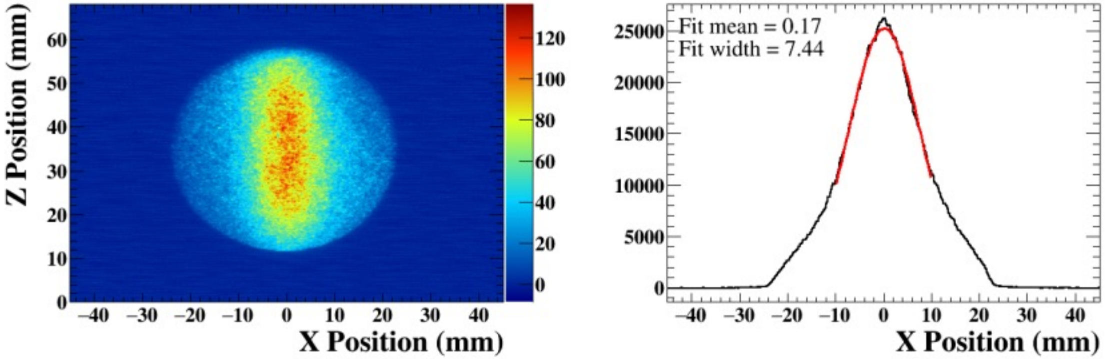
- Take beamshift at J-PARC.
- Beamloss monitor during beamline operation.
- Investigate beamline profile by beam inducing fluorescence (BIF).


VN neutrino group at J-PARC


Beam shift at CCR, J-PARC


Work in the tunnel, J-PARC





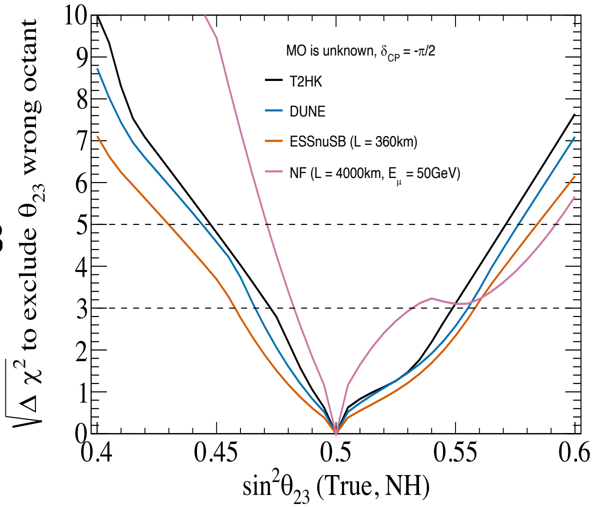
Beam profile from BIF

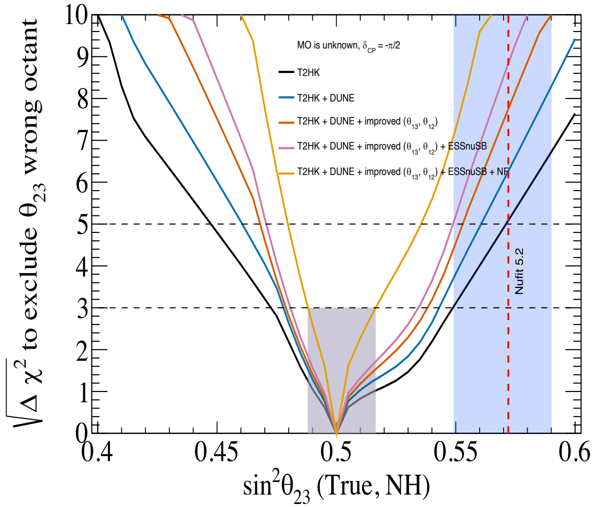
Research at IFIRSE

- **Software work :** ROOT, GLoBES, GEANT4, NEUT,…
- **Neutrino phenomenology:** CPviolation, Mass hierarchy, CPTviolation, θ_{23} octant, m_ν spectrum

✓ Master thesis:

Resolving the octant of leptonic mixing angle θ_{23} with Hyper-K experiment and the impact to the CP violation measurement.

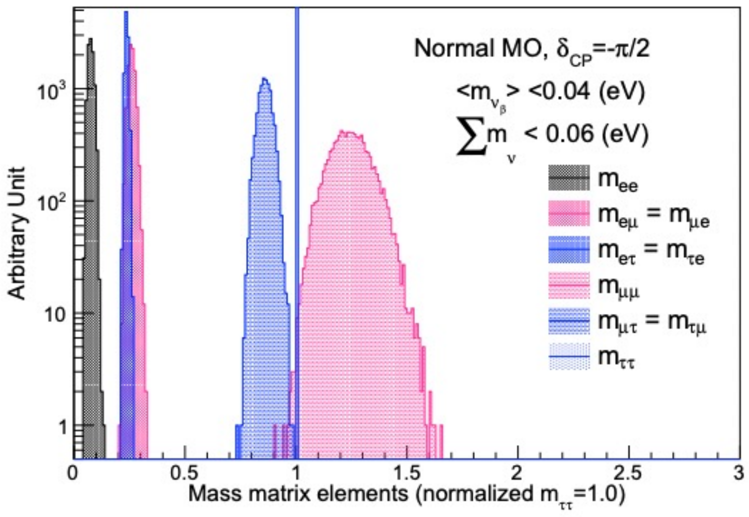




✓ PhD thesis:

Neutrino mass spectrum:

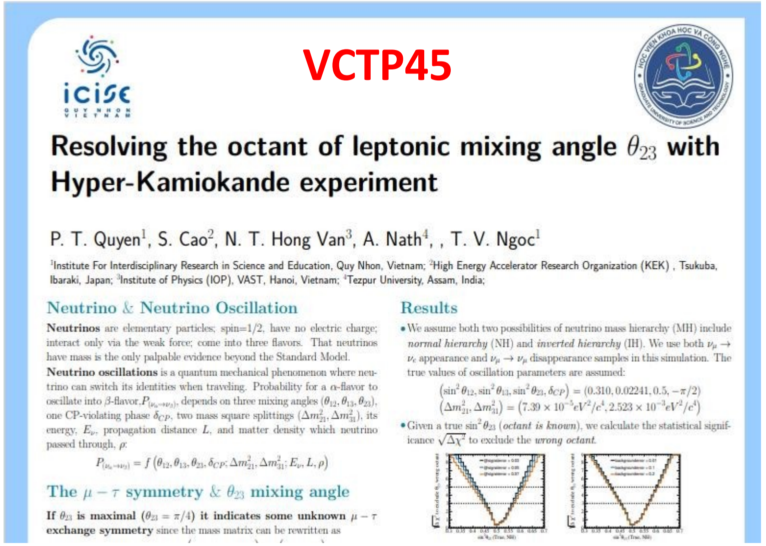
hints from neutrino oscillation, cosmology, betadecay

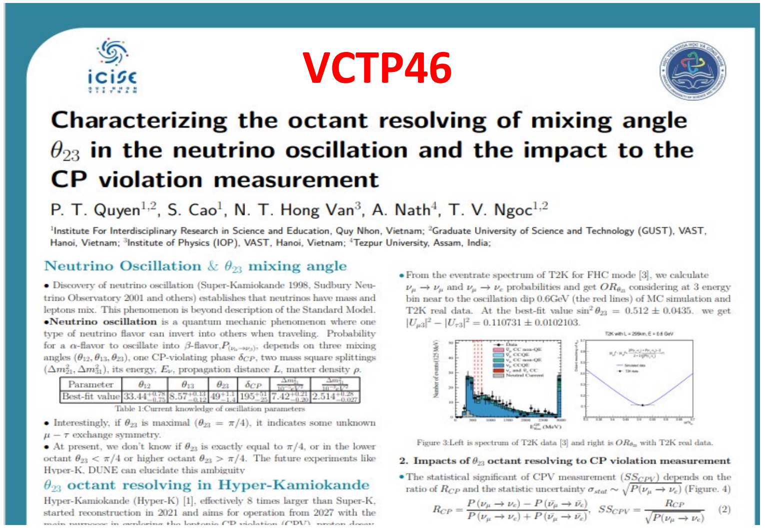


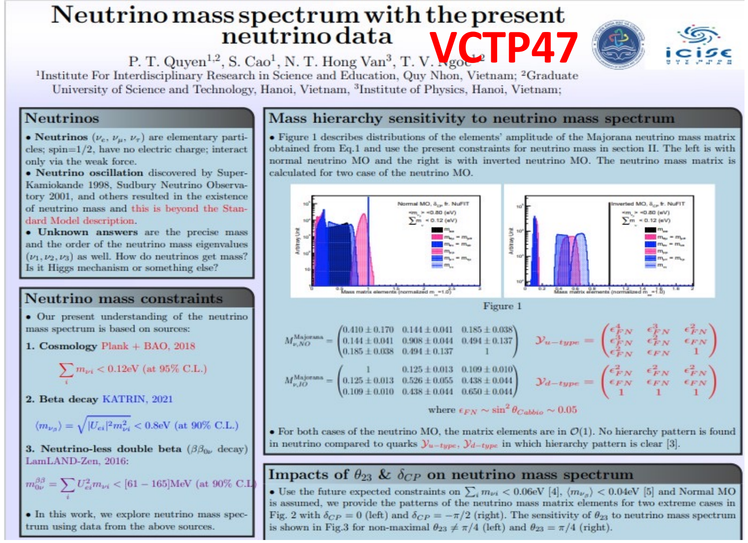
Research at IFIRSE

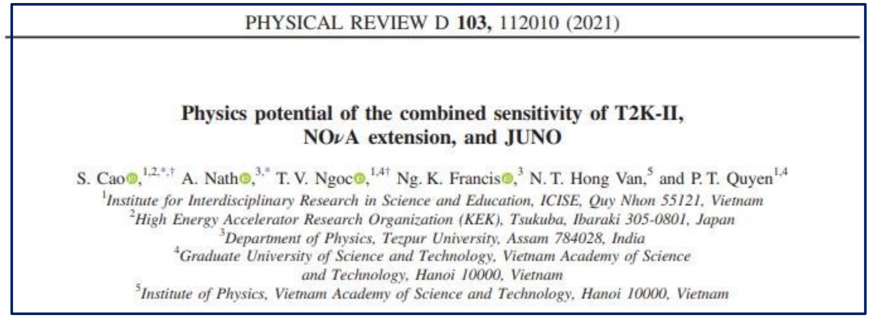
❖ **Software work :** ROOT, GLoBES

❖ Some topics: CPviolation, Mass hierarchy, CPTviolation, $\boldsymbol{\theta_{23}}$ **octant,** $\boldsymbol{m_\nu}$ **spectrum**









PHYSICAL REVIEW D **103,** 112010 (2021)

Physics potential of the combined sensitivity of T2K-II, NOνA extension, and JUNO

S. Cao,[1,2,*,†] A. Nath,[3,*] T. V. Ngoc,[1,4†] Ng. K. Francis,[3] N. T. Hong Van,[5] and P. T. Quyen[1,4]

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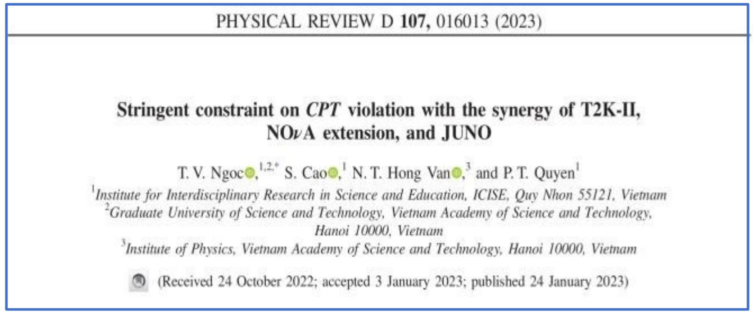
[2]High Energy Accelerator Research Organization (KEK), Tsukuba, Ibaraki 305-0801, Japan
[3]Department of Physics, Tezpur University, Assam 784028, India
[4]Graduate University of Science and Technology, Vietnam Academy of Science and Technology, Hanoi 10000, Vietnam
[5]Institute of Physics, Vietnam Academy of Science and Technology, Hanoi 10000, Vietnam



PHYSICAL REVIEW D **107,** 016013 (2023)

Stringent constraint on *CPT* violation with the synergy of T2K-II, NOνA extension, and JUNO

T. V. Ngoc,[1,2,*] S. Cao,[1] N. T. Hong Van,[3] and P. T. Quyen[1]

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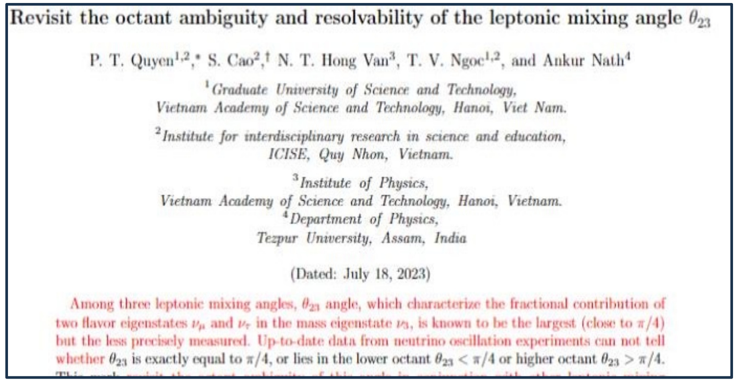

Revisit the octant ambiguity and resolvability of the leptonic mixing angle θ_{23}

P. T. Quyen[1,2,*] S. Cao[2,†] N. T. Hong Van[3], T. V. Ngoc[1,2], and Ankur Nath[4]

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[4]Department of Physics, Tezpur University, Assam, India

(Dated: July 18, 2023)

Among three leptonic mixing angles, θ_{23} angle, which characterize the fractional contribution of two flavor eigenstates ν_μ and ν_τ in the mass eigenstate ν_3, is known to be the largest (close to $\pi/4$) but the less precisely measured. Up-to-date data from neutrino oscillation experiments can not tell whether θ_{23} is exactly equal to $\pi/4$, or lies in the lower octant $\theta_{23} < \pi/4$ or higher octant $\theta_{23} > \pi/4$.

Daily life in Quy Nhon

- Interfere between mountain and sea: go swimming, hiking, fishing,….
- Friendly and kindly local people
- Free fresh air
- Fresh and cheap sea foods

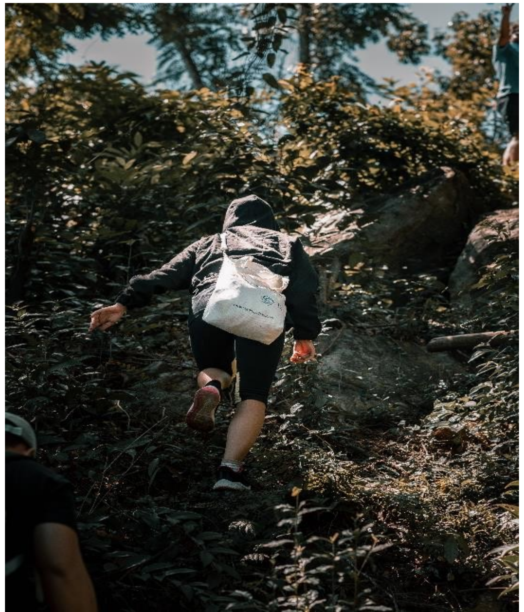
Daily life in IFIRSE

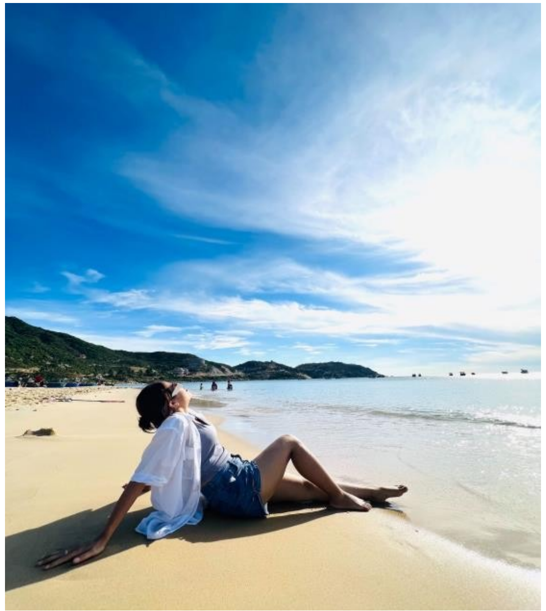
Morning

Afternoon *(sometimes)*

Evening *(sometimes)*

Happy weekend





Some words to say about life of PhD student at IFIRSE????

Happy

COmfortable

Peaceful

Scientific

An ideal place for living and doing research

If you want to enjoy neutrino physics, beach life in ICISE, sashimi in Japan.
Come with us, your dreams become true.

Thank you for your attention

Welcome to Quy Nhon