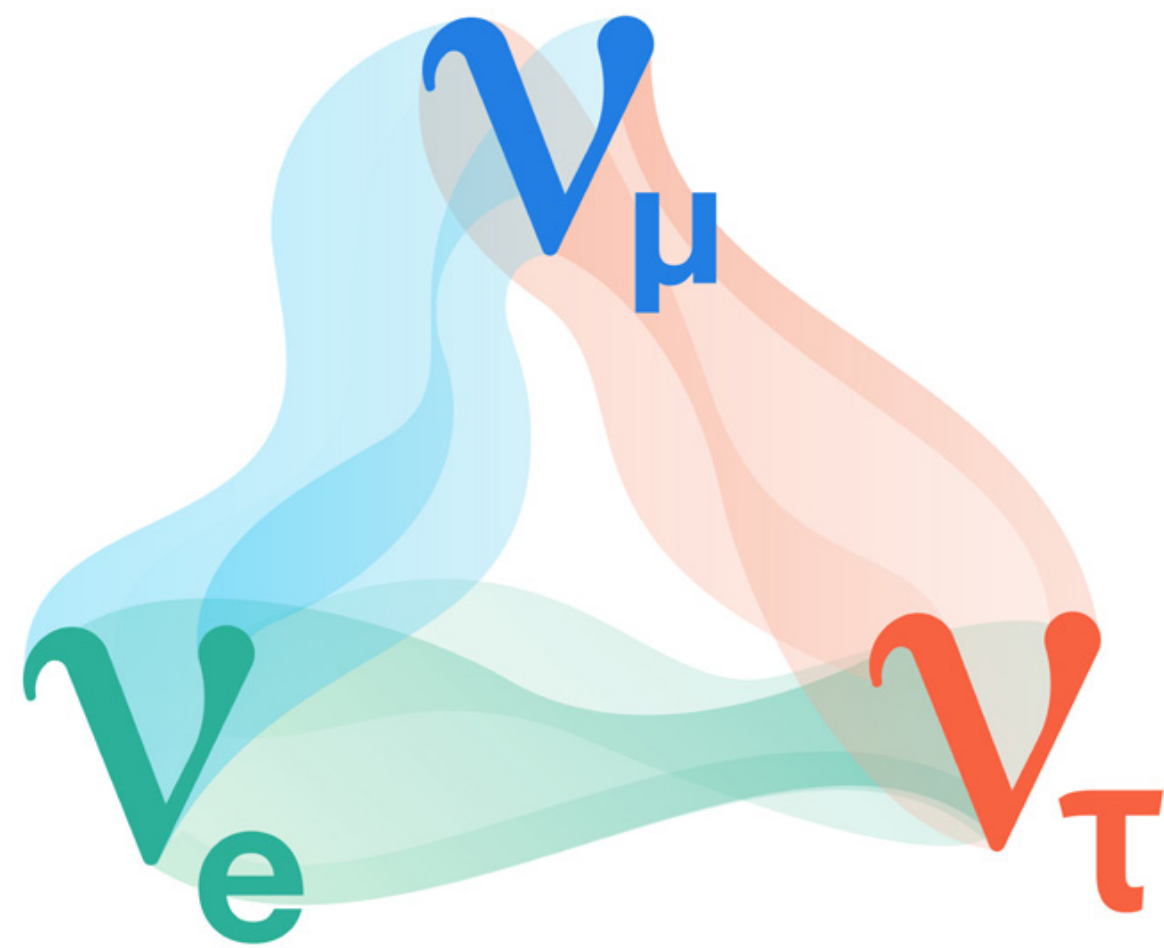


# International Neutrino Commission Report: 2026

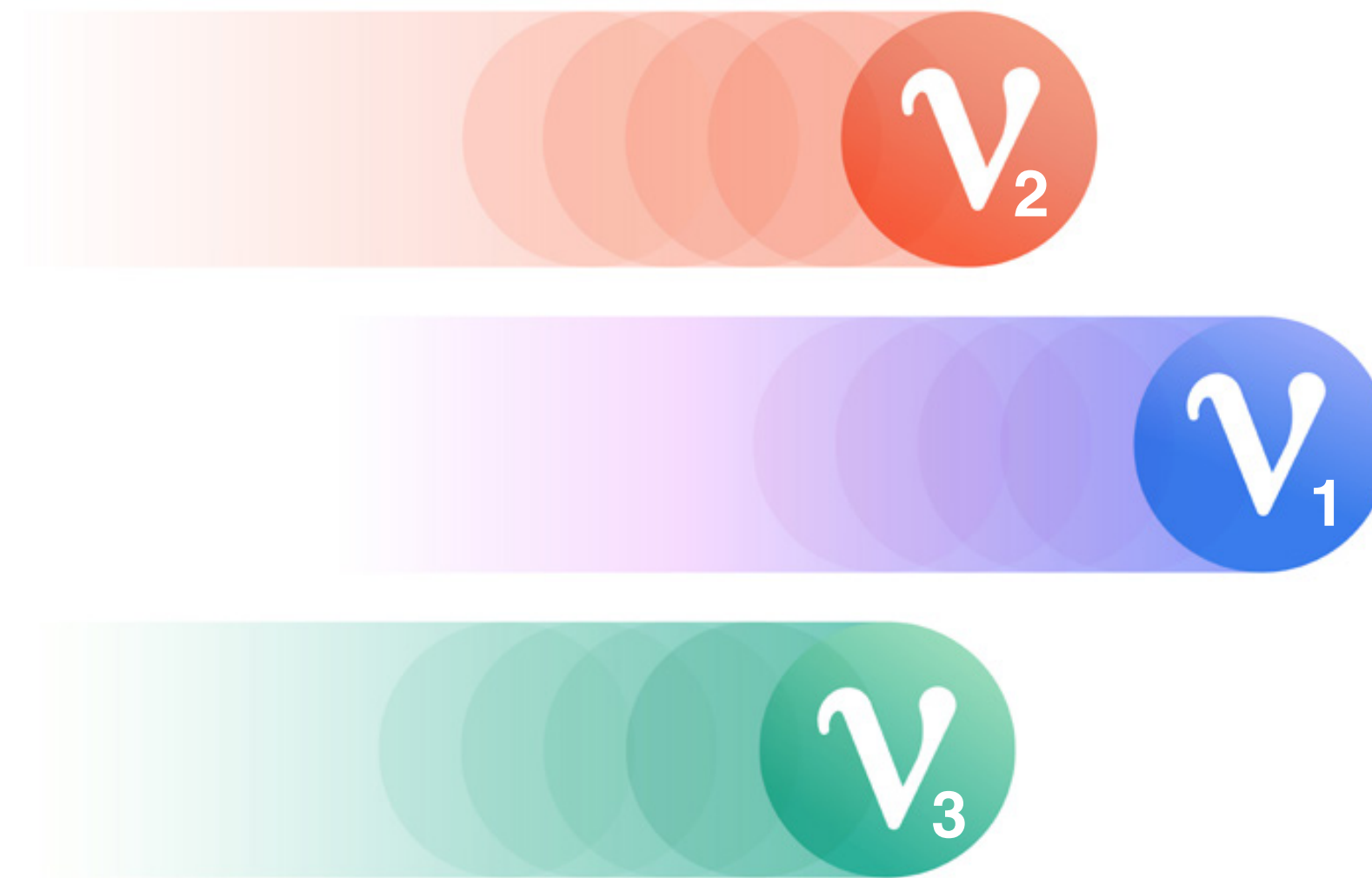
Stephen Parke: Theory, Fermilab

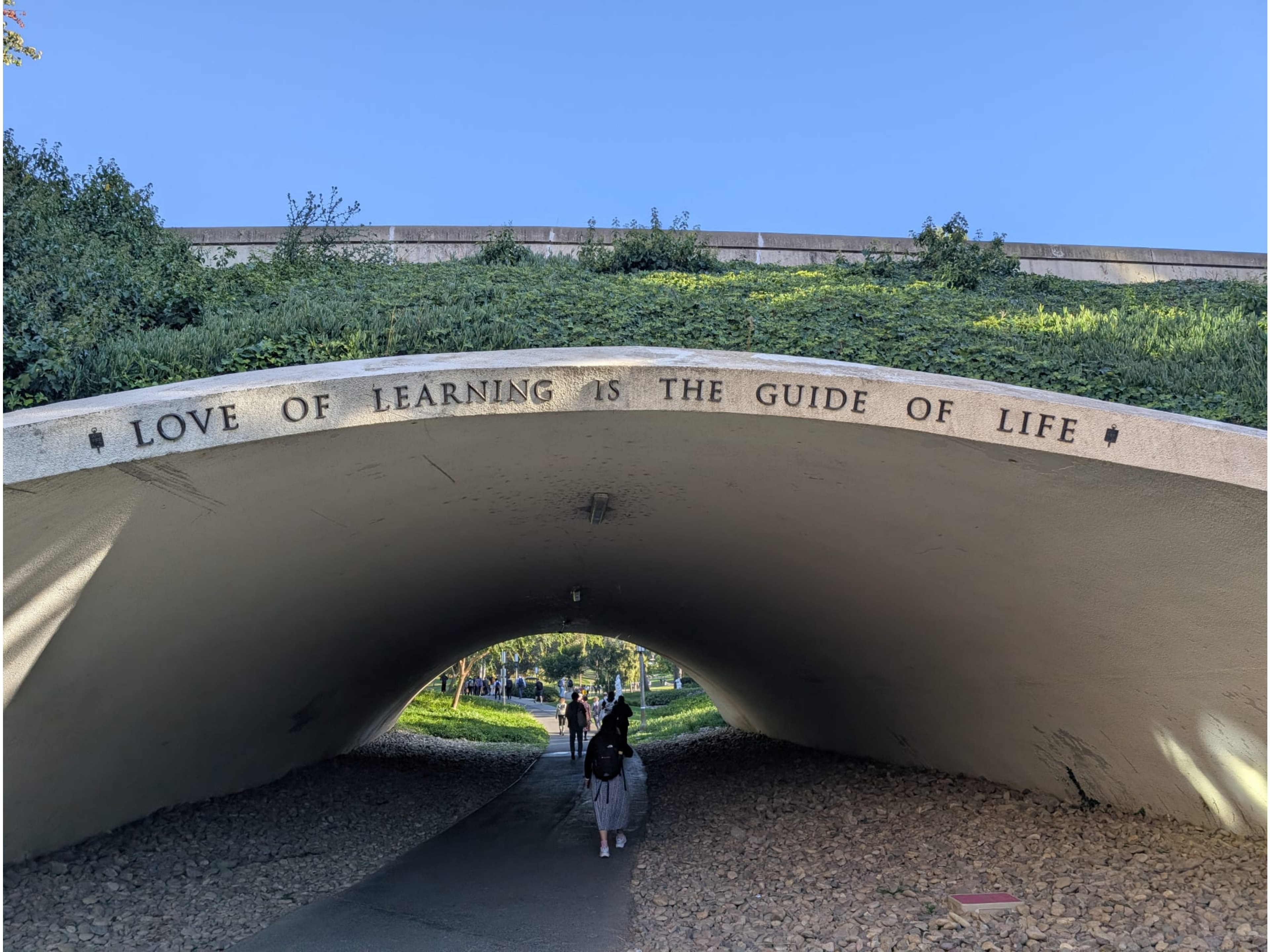
webpage <https://linktr.ee/stephen.parke>

[parke@fnal.gov](mailto:parke@fnal.gov)



$$= U$$





LOVE OF LEARNING IS THE GUIDE OF LIFE

# about Neutrinos

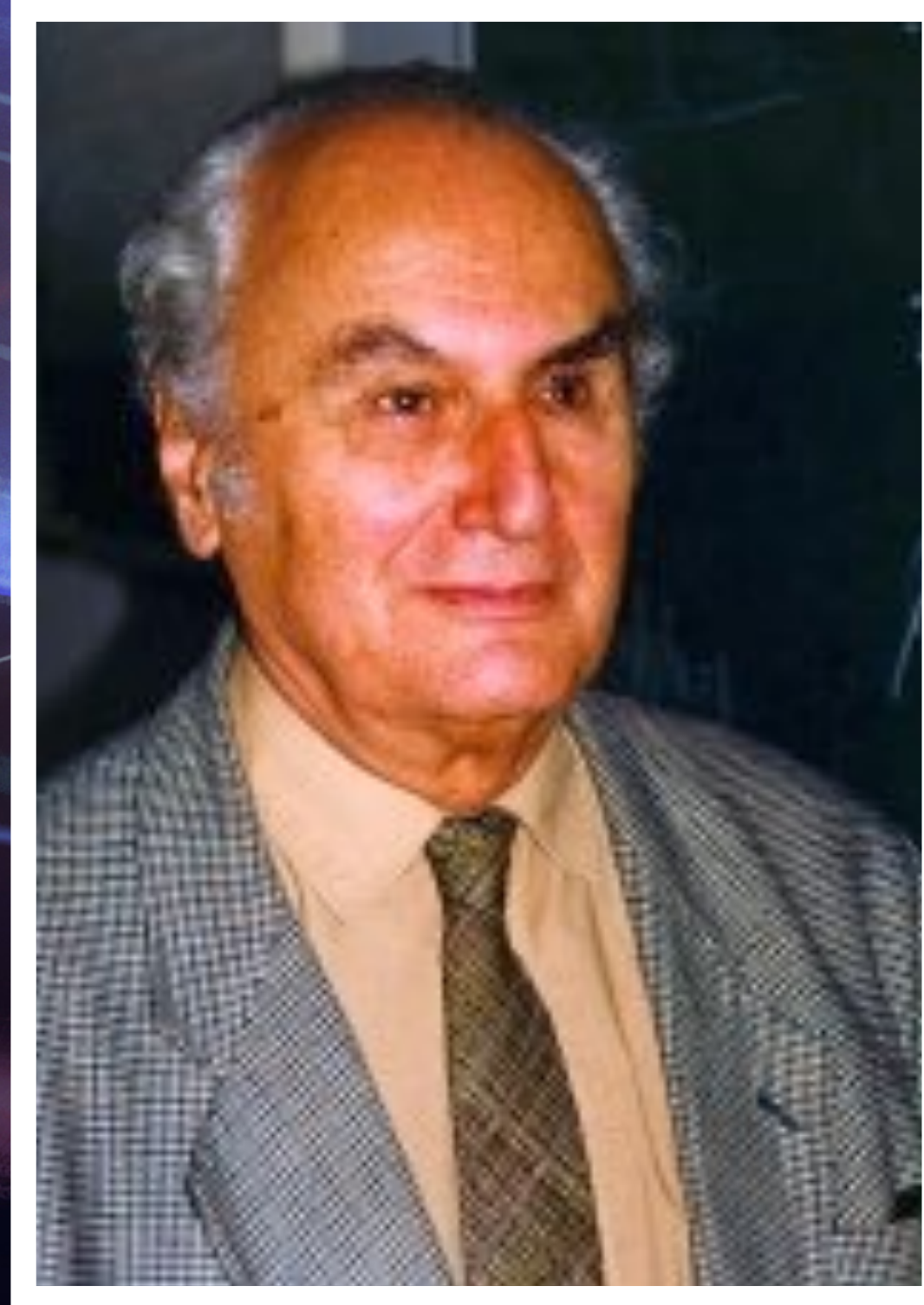


# International Neutrino Committee (INC)\* Report:

Stephen  
Parke  
Fermilab

[parke@fnal.gov](mailto:parke@fnal.gov)

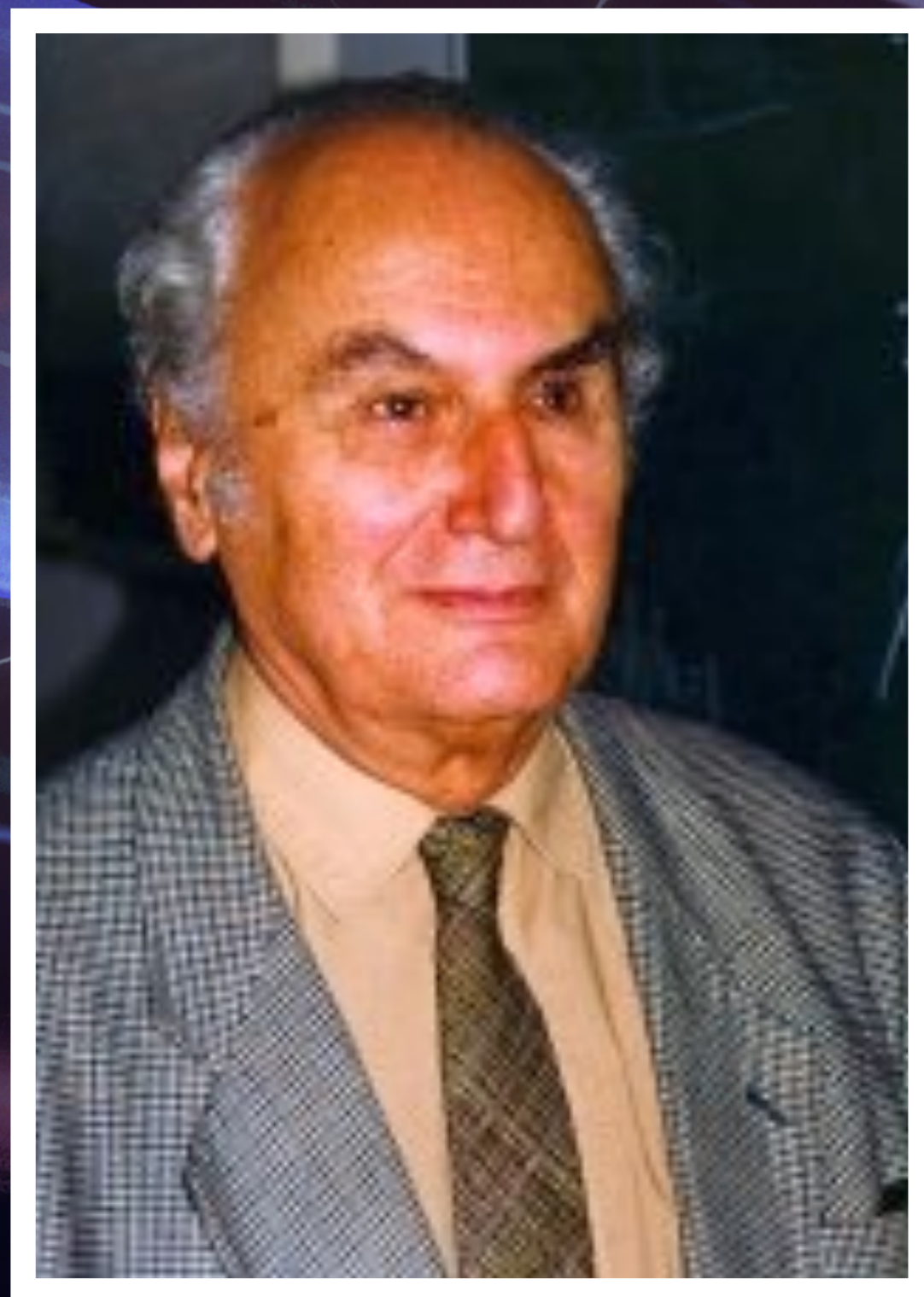
$\nu_e$  INC Chair  
2016- ..



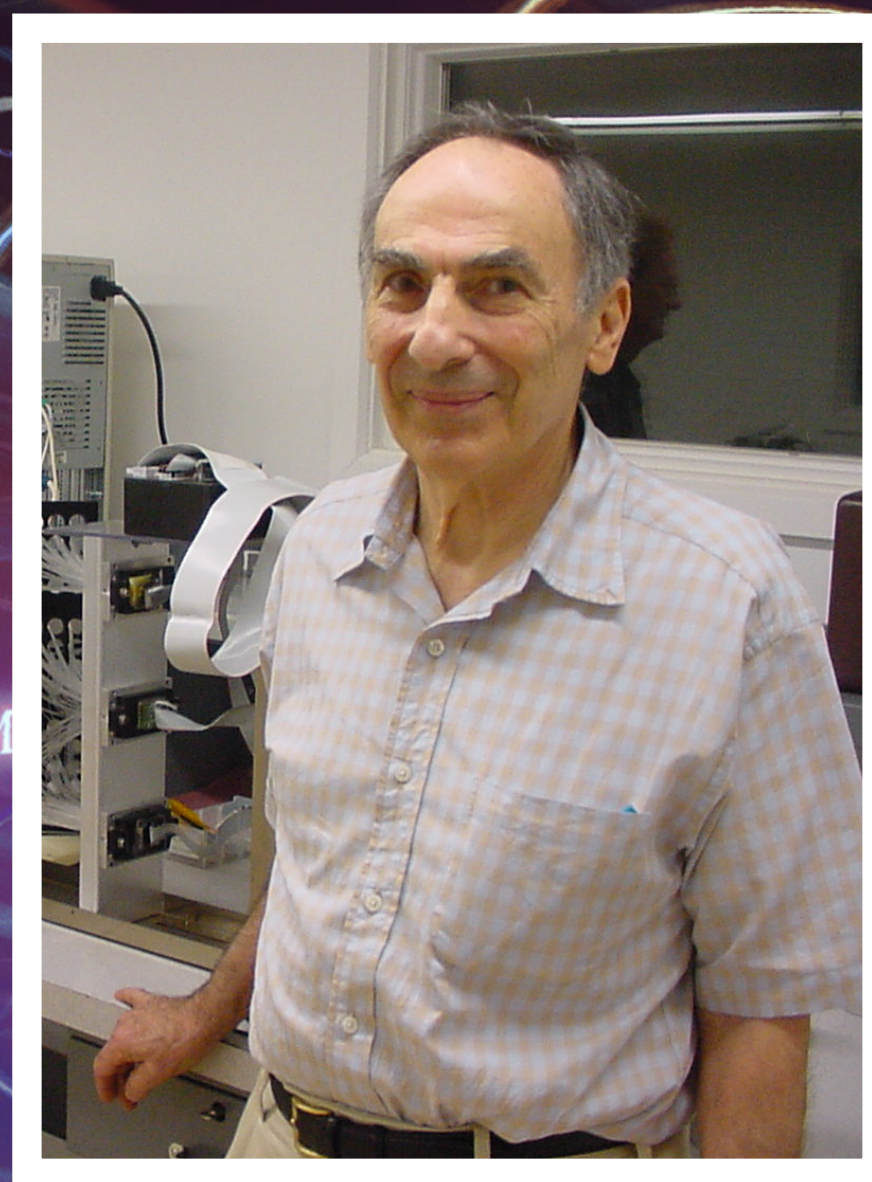
George Marx  
Nu 1972, Hungary  
Chair 1972-2002

\*INC consists of all passed chairs of Neutrino Conference

# International Neutrino Committee (INC)\* Report:



George Marx  
Nu 1972, Hungary  
Chair 1972-2002



Jack Schneps  
Nu 1988, Boston  
Chair 2004-2014

Stephen  
Parke  
Fermilab

[parke@fnal.gov](mailto:parke@fnal.gov)

$\nu_e$  INC Chair  
2016- ..

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### International Neutrino Conference Series

<b>Number</b>	<b>Year</b>	<b>City,</b>	<b>Chair or</b>
<b>website</b>	<b>proc.</b>	<b>Country</b>	<b>Co-Chairs</b>
#1	1972	Balaton, Hungary	George Marx
#2	1974	Philadelphia, USA	Sidney Bludman
#3	1975	Balaton, Hungary	George Marx
#4	1976	Aachen, Germany	Helmut Faissner
#5	1977	Elbrus, USSR	M. Markov, A.Tavkhelidze, G. Zatsepin
#6	1978	Lafayette, USA	Earle Fowler
#7	1979	Bergen, Norway	Cecilia Jarlskog
#8	1980	Erice, Italy	Ettore Fiorini
#9	1981	Maui, Hawaii, USA	Vincent Peterson
#10	1982	Balaton, Hungary	Deszo Kiss, George Marx
#11	1984	Nordkirchen, Germany	Konrad Kleinknecht
#12	1986	Sendai, Japan	Toshio Kitagaki
#13	1988	Boston, USA	Jacob Schneps
#14	1990	Geneva, Switzerland	Klaus Winter
#15	1992	Granada, Spain	Angel Morales
#16	1994	Eilat, Israel	Arnon Dar
#17	1996	Helsinki, Finland	Matts Roos
#18	1998	Takayama, Japan	Yoichiro Suzuki, Yoji Totsuka

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Jarlskog Invariant:

#19	2000	Sudbury, Canada	Art McDonald
#20	2002	Munich, Germany	Franz v. Feilitzsch, Norbert Schmitz
#21	2004	Paris, France	François Vannucci, Daniel Vignaud
#22	2006	Santa Fe, USA	Thomas Bowles
#23	2008	Christchurch, New Zealand	J. Adams, F. Halzen, S. Parke
#24	2010	Athens, Greece	George Izanakos
#25	2012	Kyoto, Japan	T. Kobayashi, M. Nakahata, T. Nakaya
#26	2014	Boston, USA	Gary Feldman, Ed Kearns
#27	2016	London, UK	Ken Long, Silvia Pascoli
#28 <sup>[3]</sup>	2018 <sup>[4]</sup>	Heidelberg, Germany	Guido Drexlin, Manfred Lindner
#29 <sup>[5]</sup>	2020 <sup>[6][7]</sup>	Chicago, USA	S. Brice, M. Marshall, G. Zeller
#30 <sup>[8]</sup>	2022 <sup>[9][10]</sup>	Seoul, South Korea	Yeongduk Kim, Seon-Hee Seo
#31 <sup>[11]</sup>	2024 <sup>[12][13]</sup>	Milan, Italy	Chiara Brofferio, Giocchino Ranucci
#32 <sup>[14]</sup>	2026	Irvine, USA	Mu-Chun Chen, Michael Smy

# INC @ Nu 2026

Tuesday Afternoon



**Mu-Chun Chen, Co-Chair**



**Michael Smy, Co-Chair**

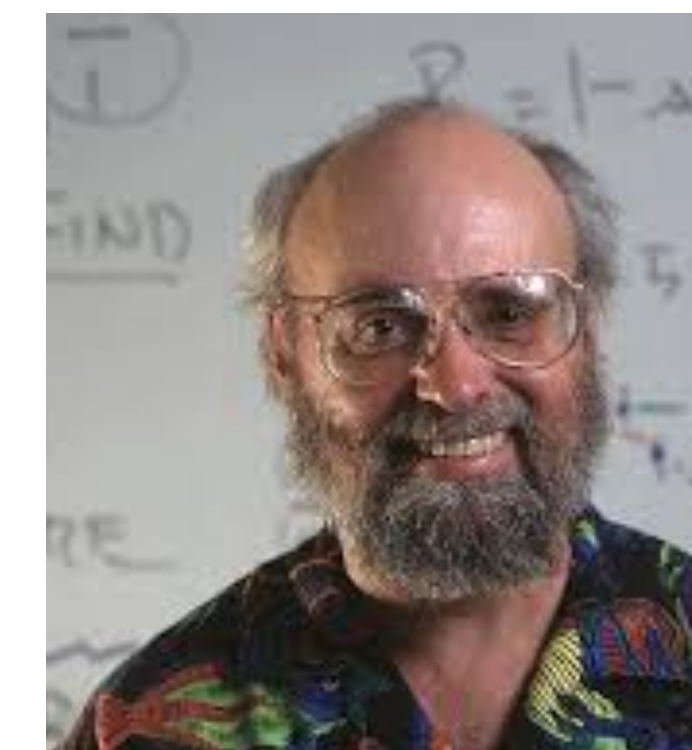
# INC @ Nu 2026

## Tuesday Afternoon

**Gioacchino Ranucci**  
Milan, 2024



**Yeongduk Kim + Seon-Hee Seo**  
Seoul, South Korea, 2022



**John Learned**  
Wailea, USA, 1981



**Mu-Chun Chen, Co-Chair**



**Bill Louis**  
Sante Fe, 2006



**Michael Smy, Co-Chair**



**Ed Kearns + Gary Feldman**  
Boston, USA, 2014



**Masavuki Nakahata**  
Kyoto, Japan, 2012



**Tsuyoshi Nakaya**  
Kyoto, Japan, 2012



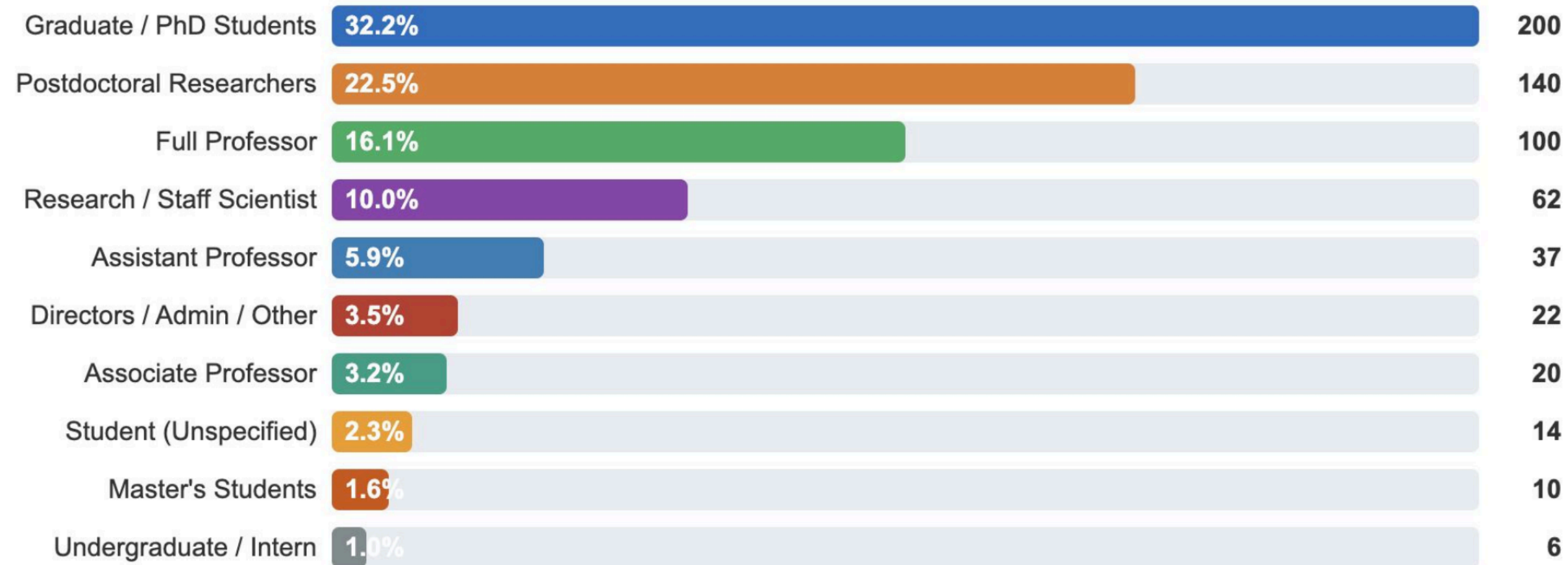
**Stephen Parke**  
Christchurch 2008

# Nu 2026 Statistics:

## Participants

**Junior Participants = 370**

### Career Stage — Entry Count & Share

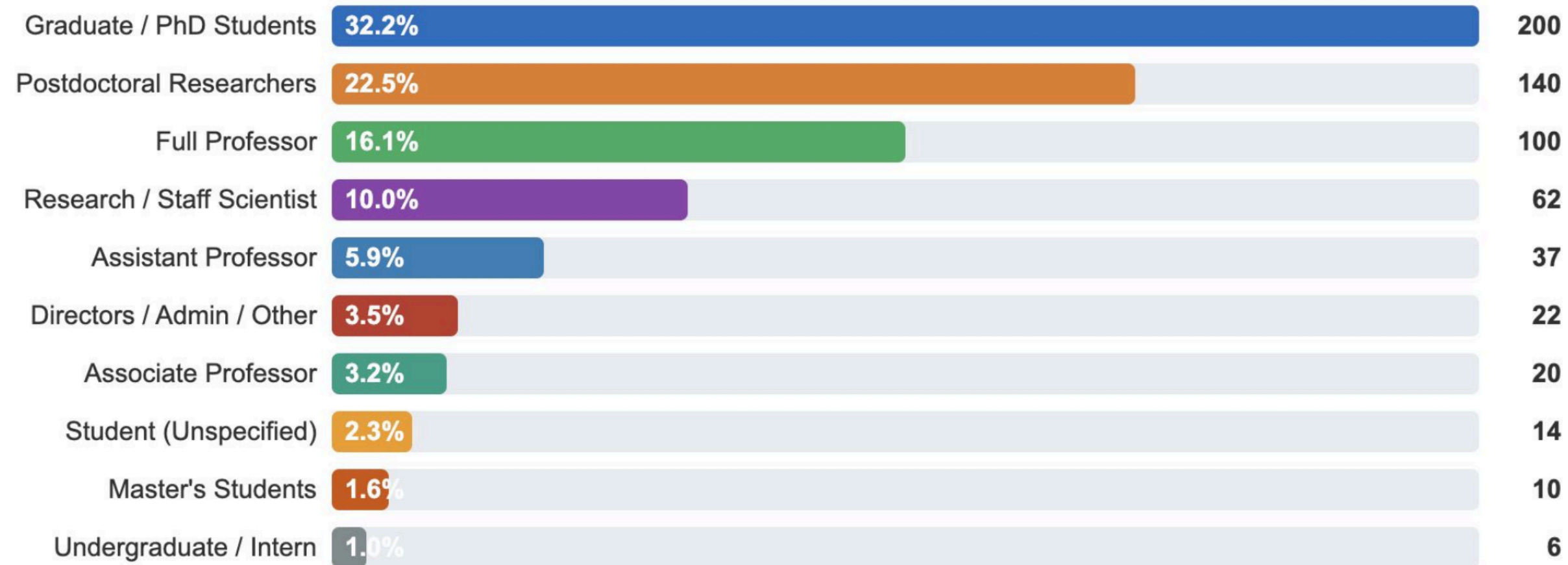


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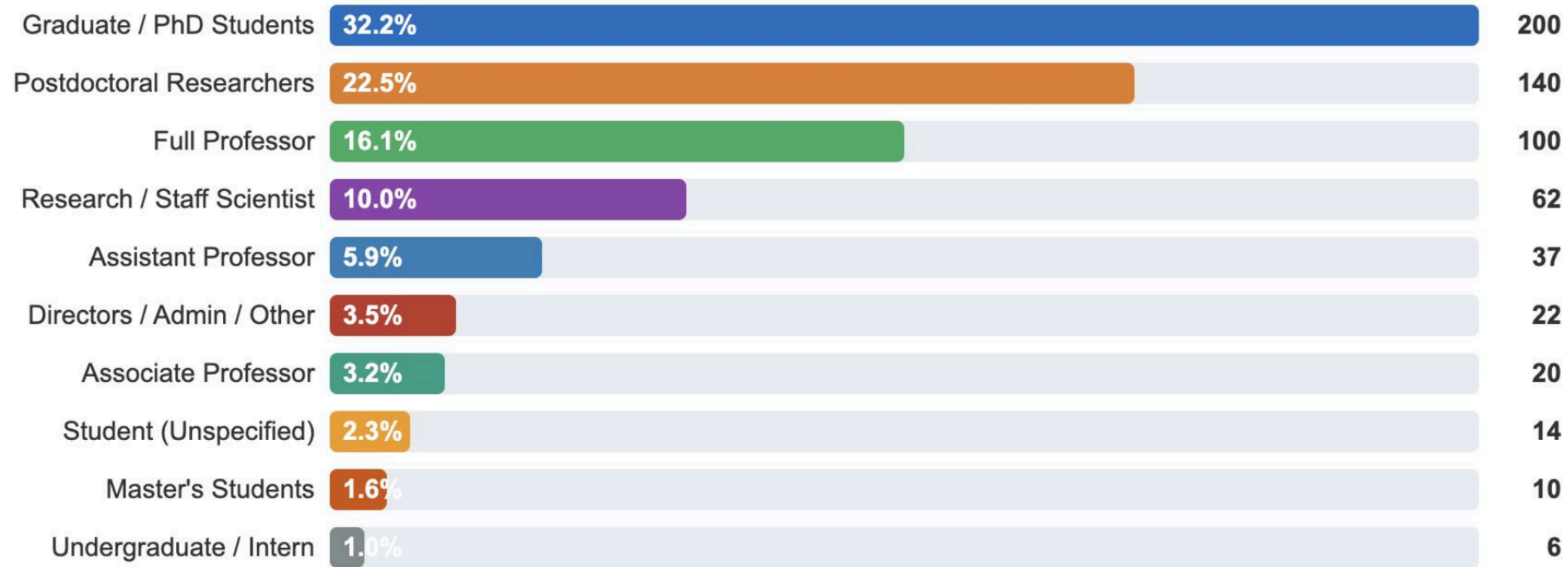
**! 447 posters !**

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Career Stage — Entry Count & Share



	Experimental Collaboration	Experimental Overview	Theory	Total
<b>Total Number</b>	30	14	15	59
<b>Female Speakers</b>	9	6	4	19 (32%)
<b>Europe</b>	8	5	1	14
<b>North America</b>	16	7	10	31
<b>Asia</b>	6	2	1	9
<b>Junior</b>	15	2	2	20

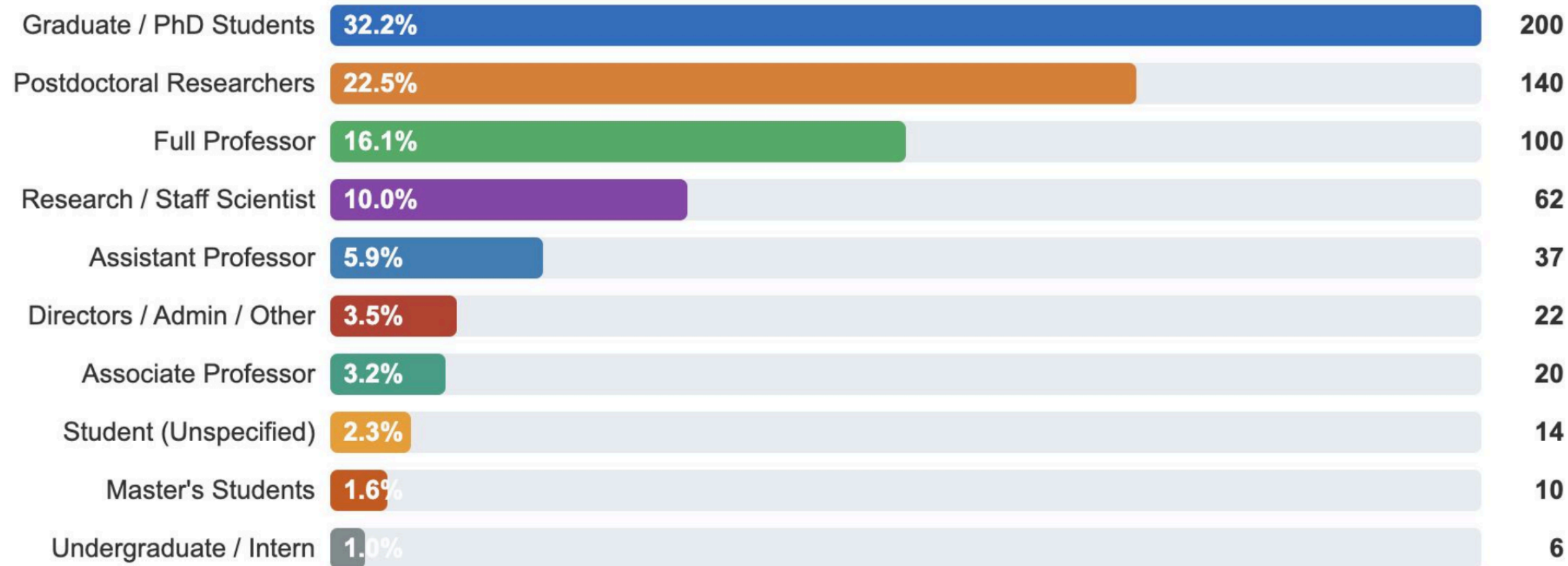
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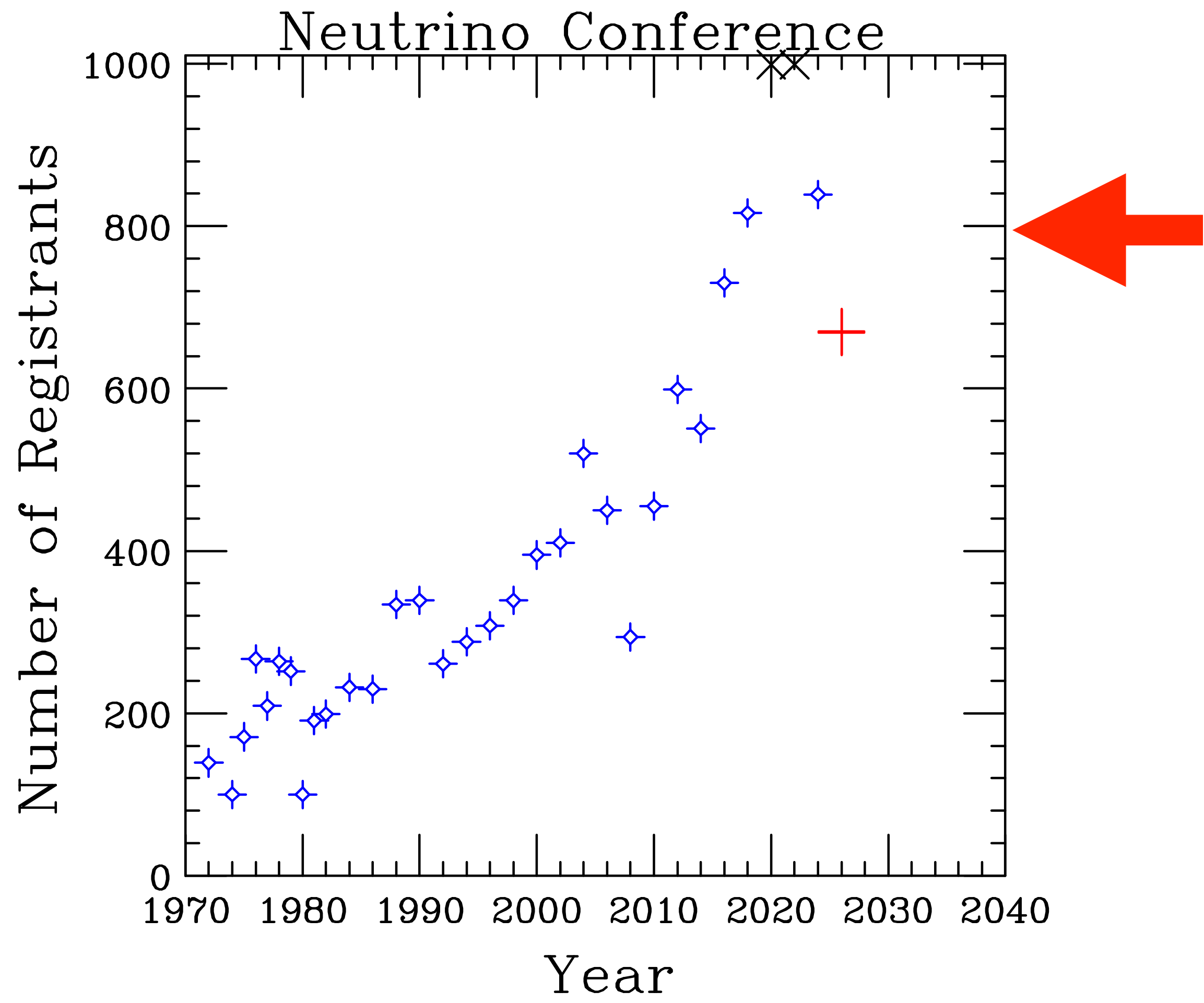
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<b>Junior</b>	15	2	2	20

**~ 35 % of participants where female**

**32 % talks by female speakers**

**Goal is = or > ?**

**The Exp. Collaborations that suggested names did better than Nu 2024 !**



# Neutrino Conference Format:

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- Plenary + Posters only
- In-person (not hybrid)
- IUPAP guidelines to be followed

# Neutrino Conference Format:

- Plenary + Posters only
- In-person (not hybrid)
- IUPAP guidelines to be followed
- Talks on Indico available after/during the talk, NOT before
- Accommodate Disabilities for participants
- Talks and Posters on Zenedo

**What about  
Neutrino 2028 ?**



**Jun Cao, IHEP,**

# **Nu 2028 Beijing, China**



**Wei Wang,  
Sun Yat-san U.**



<http://neutrino2028.ihep.ac.cn>

# NEUTRINO 2028

XXXIII International Conference on Neutrino Physics and Astrophysics

Beijing, China June, 2028

◆ **Contact:**

[neutrino2028@ihep.ac.cn](mailto:neutrino2028@ihep.ac.cn)

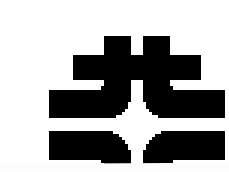
◆ **Conference date (5.5 days including 0.5 day excursion)**

**June 19-24, or June 26 - July 1 ?**

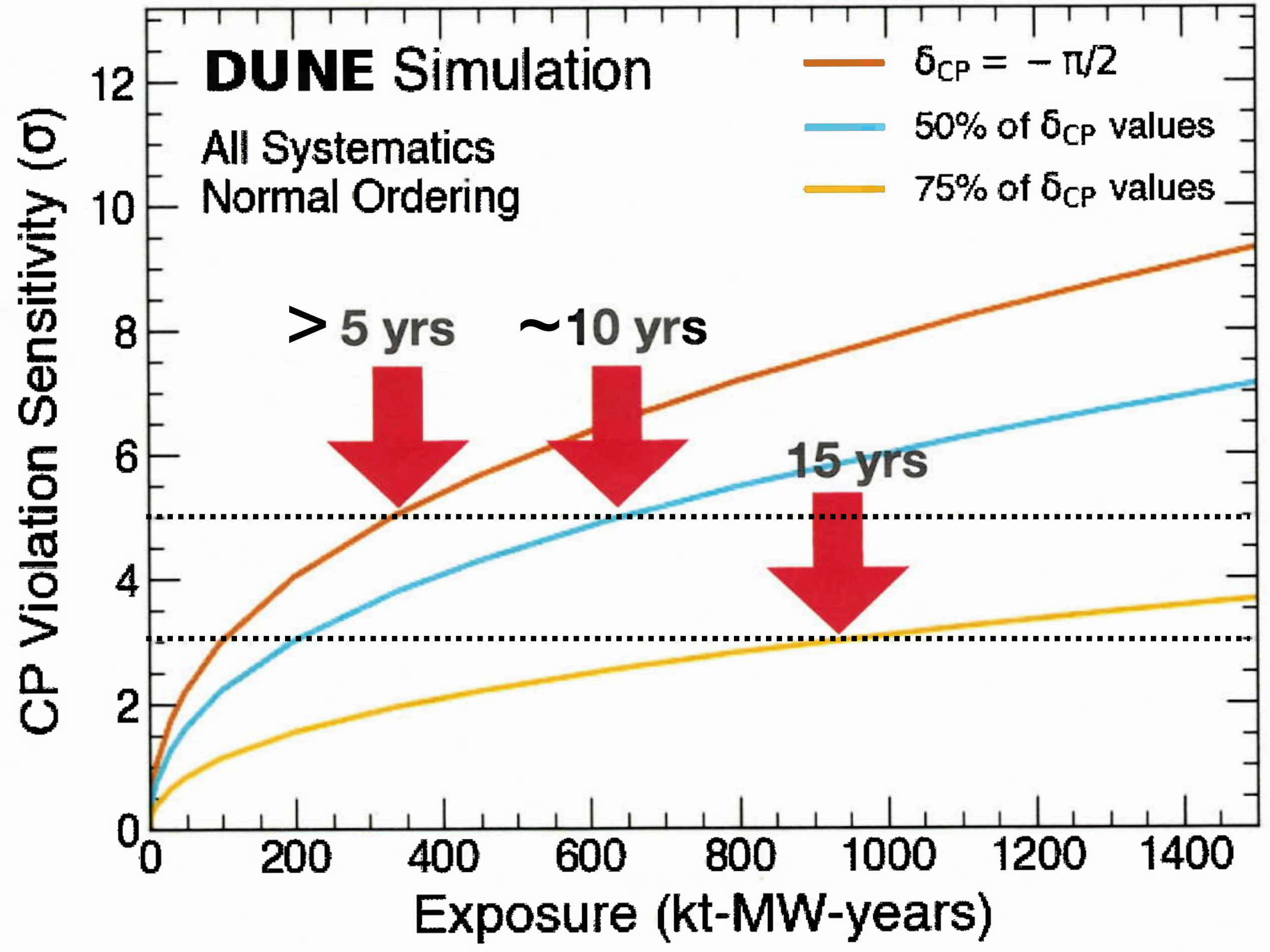
# Call for Co-Chairs/Locations for future meetings:

- **Nu 2032 Americas/Asia:**      **decision at Nu2028**

[parke@fnal.gov](mailto:parke@fnal.gov)

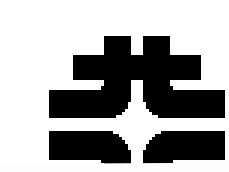


# DUNE CP Sensitivity:

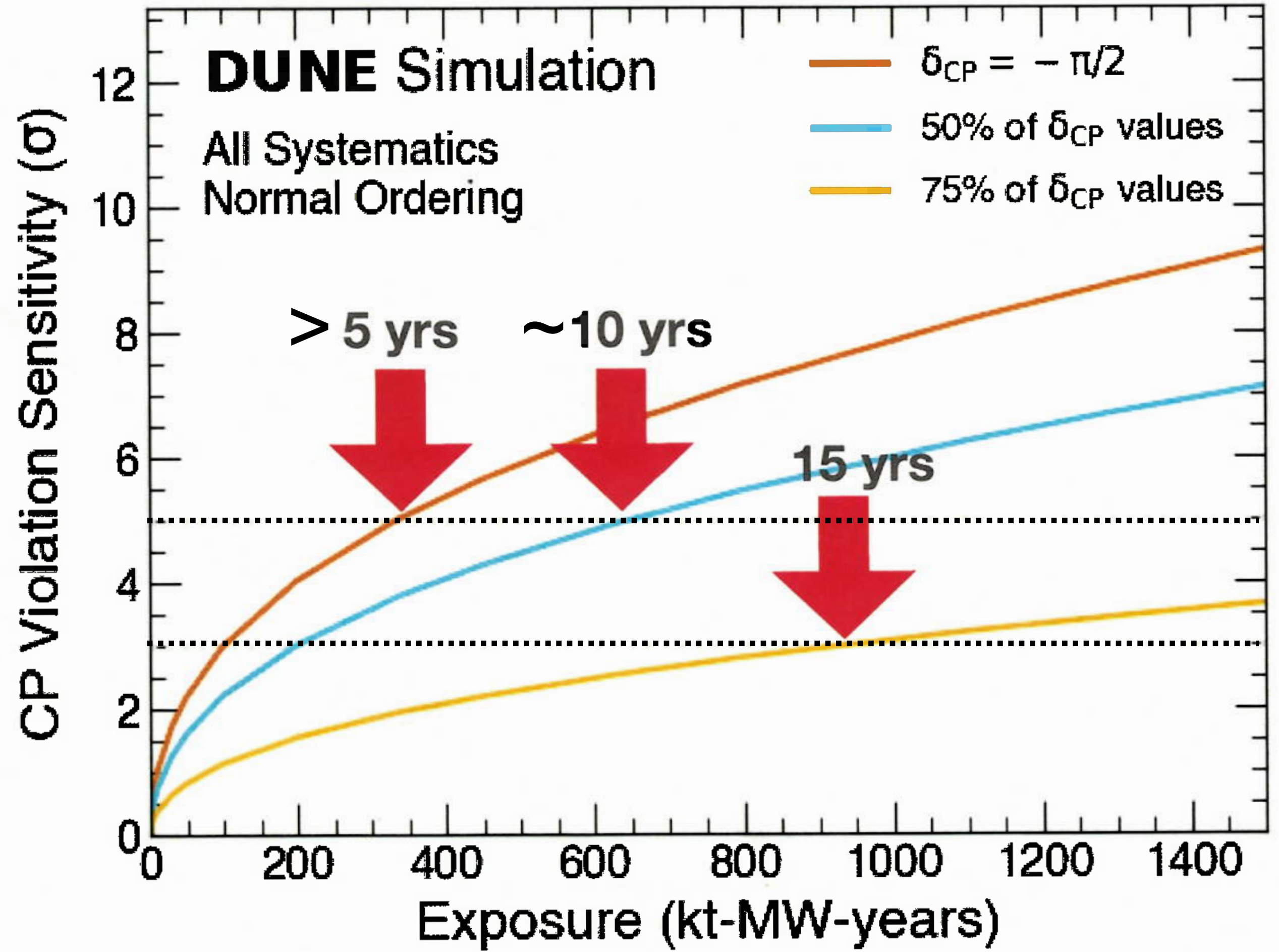


Phase I      Phase II

$\sim 300, \sim 600, \sim 900$   
kt-MW-yrs



# DUNE CP Sensitivity:



Phase I                      Phase II

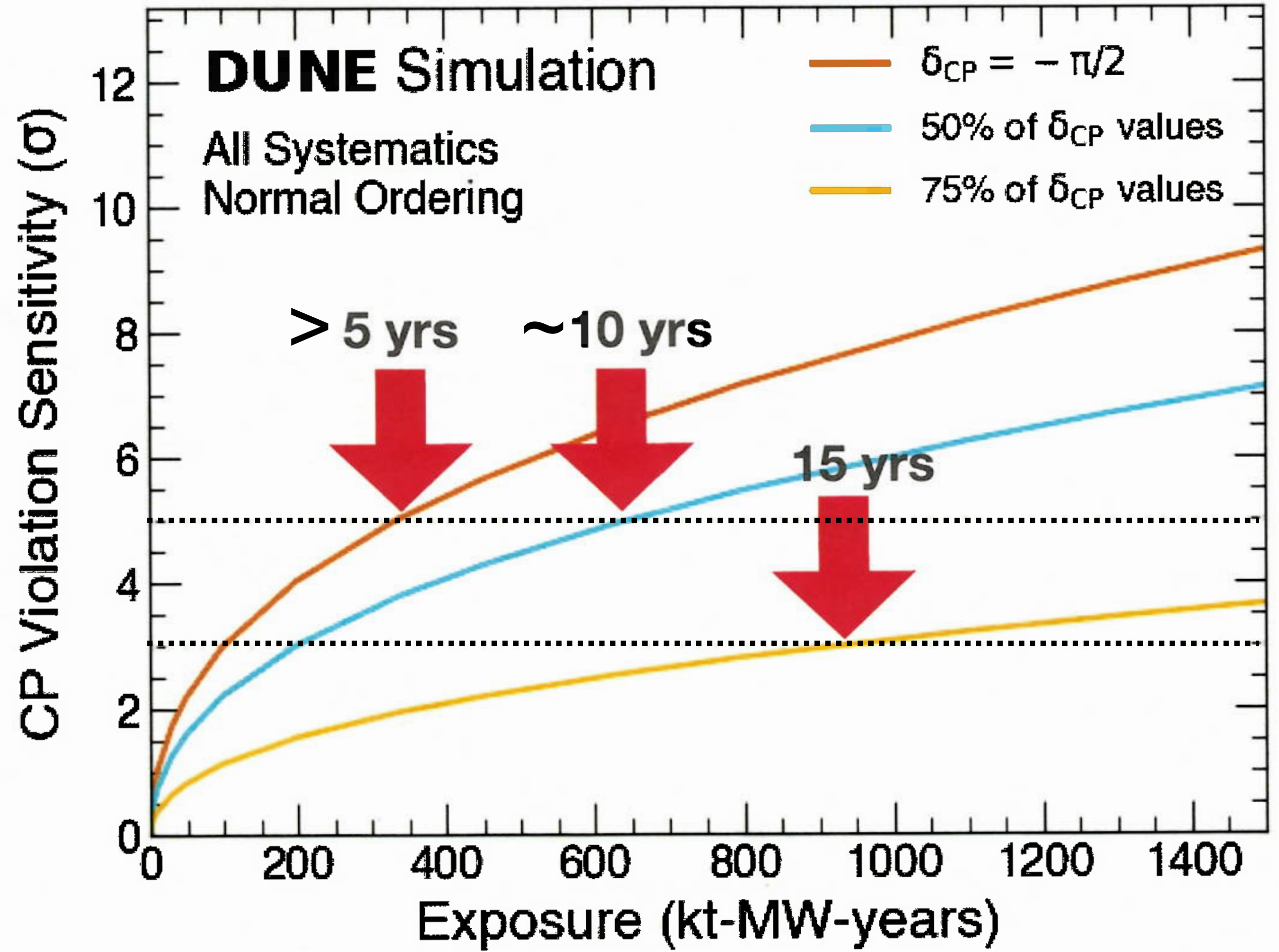
~300, ~600, ~900  
kt-MW-yrs

Phase I = 1.1 MW + 2 x 10 kton  
22 kt-MW-year / year

Phase II = 2.1 MW + 4 x 10 kton  
84 kt-MW-year / year



# DUNE CP Sensitivity:



Phase I      Phase II

$\sim 300, \sim 600, \sim 900$   
kt-MW-yrs

$|\sin \delta|$       **CPV**

$= 1.0$

$\geq 0.71$       50 % of  $\delta = 29$  % of  $\sin \delta$

$\geq 0.38$       75 % of  $\delta = 62$  % of  $\sin \delta$

$\geq 2$  reduction

Phase I = 1.1 MW + 2 x 10 kton  
22 kt-MW-year / year

Phase II = 2.1 MW + 4 x 10 kton  
84 kt-MW-year / year

# **What about Neutrino 2030 ?**

**100 years  
since Pauli !**



Olga Mena



Mariam Tórtola



Sergio Pastor

# Neutrino 2030

## Valencia, Spain



At least 2 will attend the INC meetings in person until 2040+.

спасибо  
danke 謝謝  
ngiyabonga  
teşekkür ederim  
dank je  
gracias tapadh leat  
moichackeram  
go raibh maith agat  
bedankt  
hvala maumuru  
dziękuję  
sagolun  
sukriya kop khun krap  
arigatō takk dakujem  
merci  
obrigado  
terima kasih  
ευχαριστώ  
감사합니다  
мерси

danke 謝謝

ngiyabonga  
teşekkür ederim

спасибо

dank je

thank you gracias

tapadh leat

mochchakkeram

go raibh maith agat

bedankt

hvala

mauruuru

dziękuję

sagolun

sukriya kop khun krap

obrigado

grazie

arigatō

takk

dakujem

мерси

all in

terima kasih

감사합니다

ευχαριστώ

merci

See you  
Beijing, 中

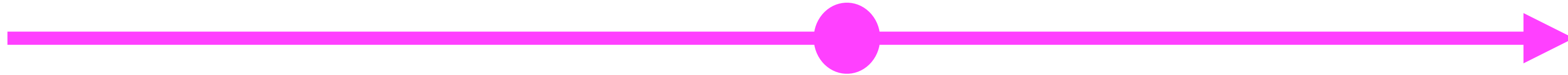
**Fun**

**NO** : **IO**

either

$$\Delta m_{ee}^2 = c_{12}^2 \Delta m_{31}^2 + s_{12}^2 \Delta m_{32}^2$$

ee



$|\Delta m_{jk}^2|$

**NO** : **IO**

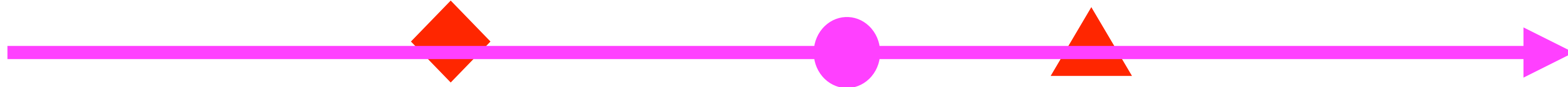
either

$$\Delta m_{ee}^2 = c_{12}^2 \Delta m_{31}^2 + s_{12}^2 \Delta m_{32}^2$$

**32**

ee

**31**



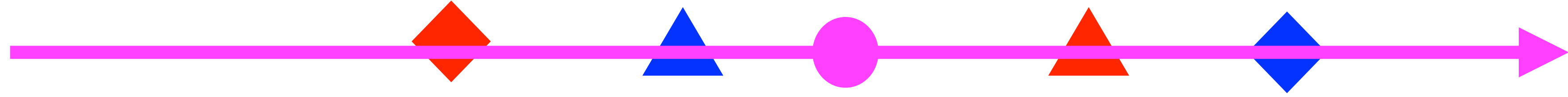
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**NO** : **IO**

either

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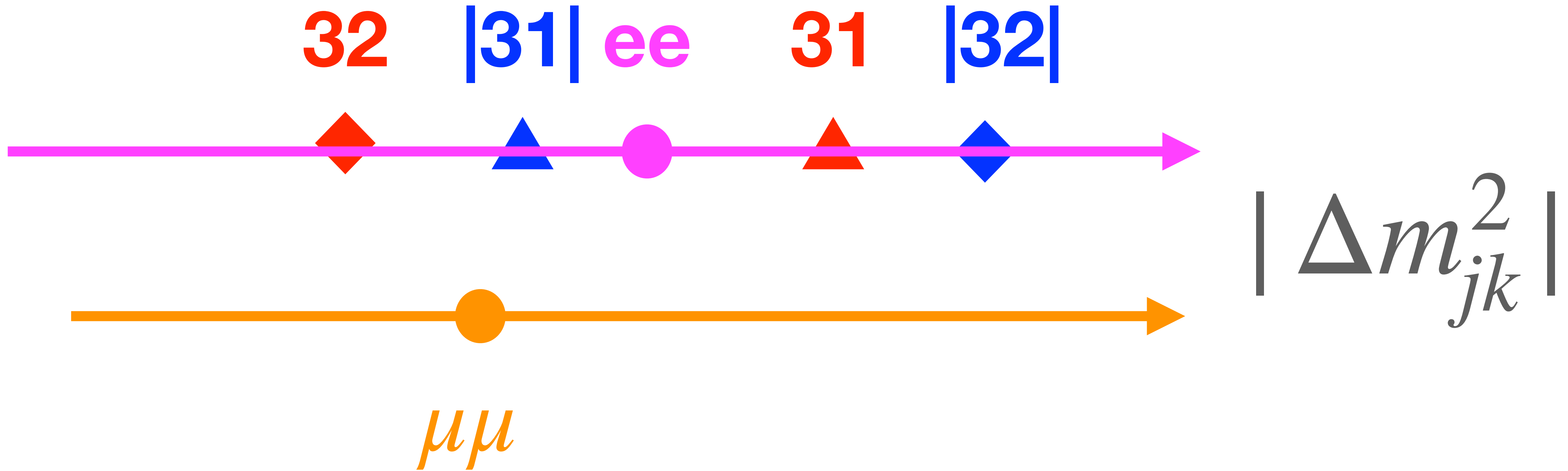
**32**   **|31|**   ee   **31**   **|32|**



$|\Delta m_{jk}^2|$

**NO : IO**  
 either

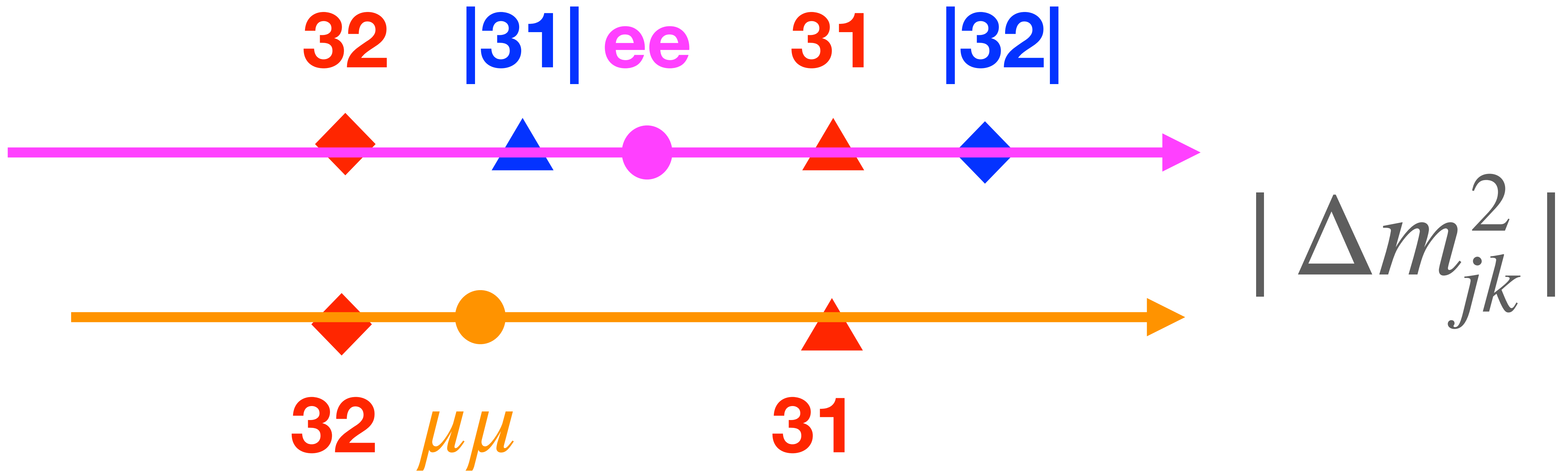
$$\Delta m_{ee}^2 = c_{12}^2 \Delta m_{31}^2 + s_{12}^2 \Delta m_{32}^2$$



$$\Delta m_{\mu\mu}^2 \approx s_{12}^2 \Delta m_{31}^2 + c_{12}^2 \Delta m_{32}^2 + s_{13} \cos \delta \Delta m_{21}^2$$

**NO** : **IO**  
 either

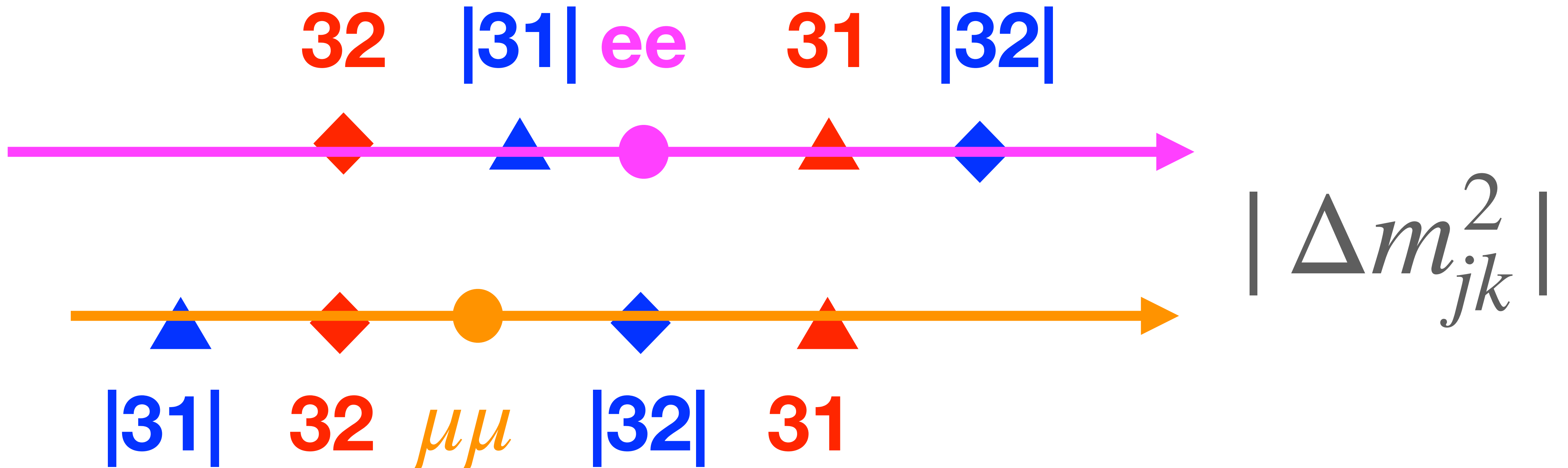
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**NO : IO**  
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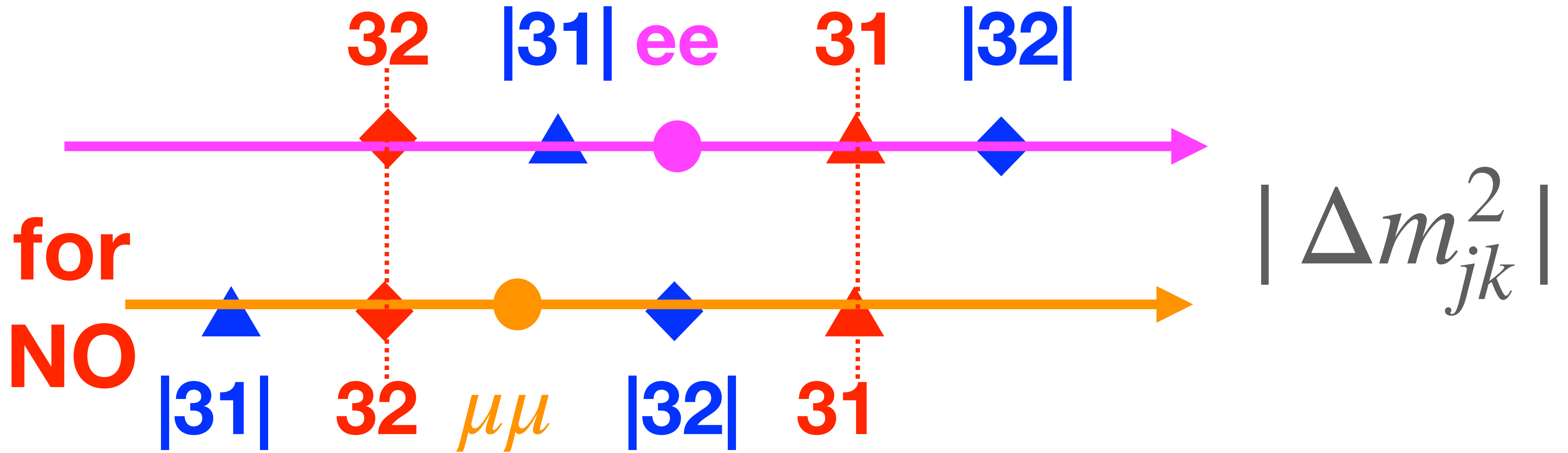


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**NO : IO**

either

$$\Delta m_{ee}^2 = c_{12}^2 \Delta m_{31}^2 + s_{12}^2 \Delta m_{32}^2$$



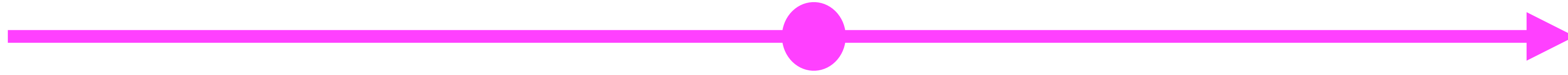
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**NO** : **IO**

or

$$\Delta m_{ee}^2 = c_{12}^2 \Delta m_{31}^2 + s_{12}^2 \Delta m_{32}^2$$

ee



$|\Delta m_{jk}^2|$

$$\Delta m_{\mu\mu}^2 \approx s_{12}^2 \Delta m_{31}^2 + c_{12}^2 \Delta m_{32}^2 + s_{13} \cos \delta \Delta m_{21}^2$$

**NO** : **IO**

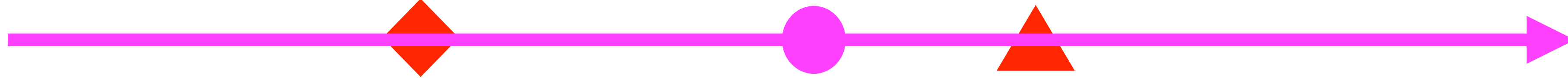
or

$$\Delta m_{ee}^2 = c_{12}^2 \Delta m_{31}^2 + s_{12}^2 \Delta m_{32}^2$$

**32**

ee

**31**



$|\Delta m_{jk}^2|$

$$\Delta m_{\mu\mu}^2 \approx s_{12}^2 \Delta m_{31}^2 + c_{12}^2 \Delta m_{32}^2 + s_{13} \cos \delta \Delta m_{21}^2$$

**NO** : **IO**

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$$\Delta m_{ee}^2 = c_{12}^2 \Delta m_{31}^2 + s_{12}^2 \Delta m_{32}^2$$

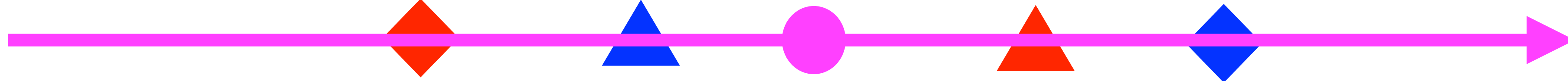
**32**

**|31|**

ee

**31**

**|32|**



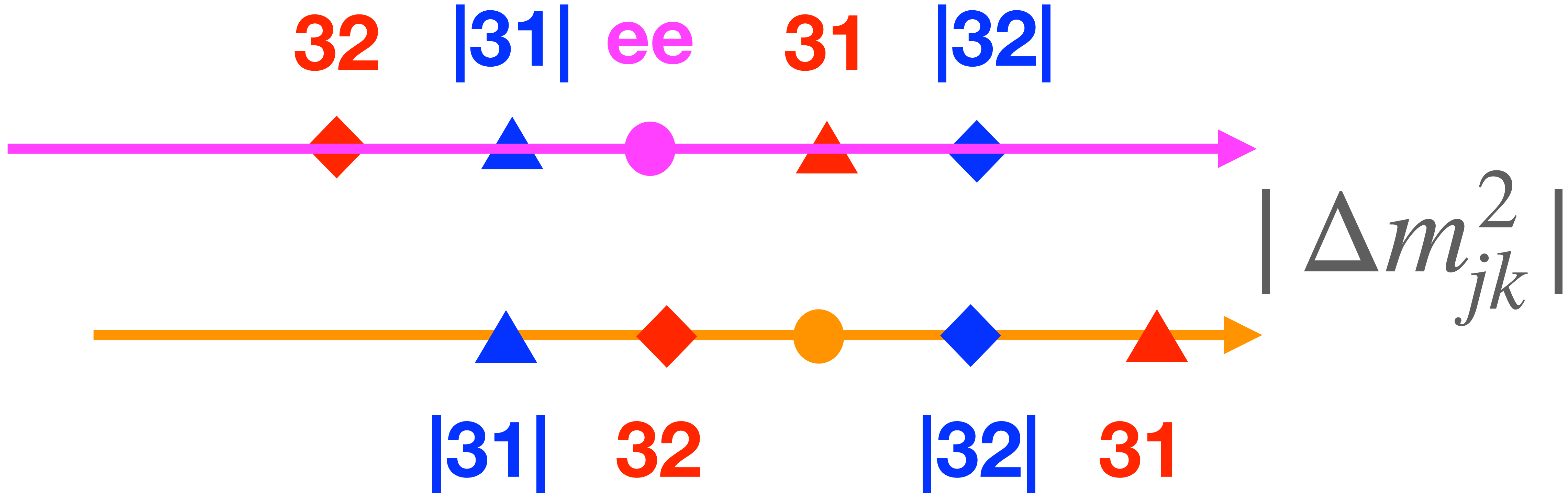
**|**  $\Delta m_{jk}^2$  **|**

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**NO** : **IO**

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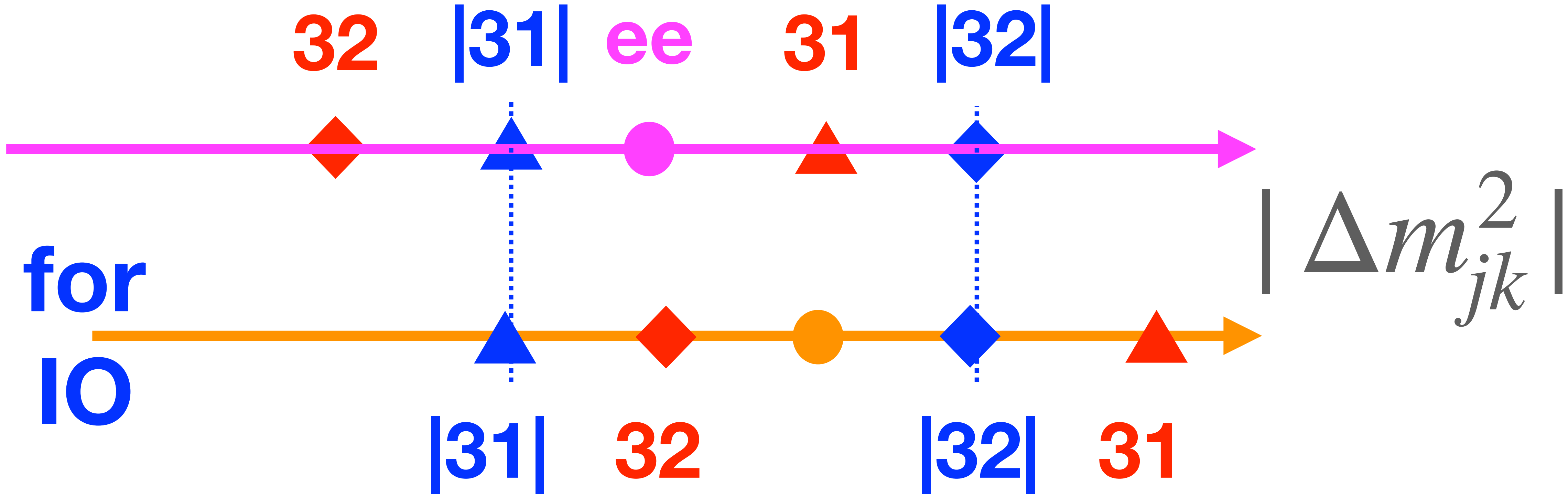


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**NO** : **IO**

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$$\Delta m_{\mu\mu}^2 \approx s_{12}^2 \Delta m_{31}^2 + c_{12}^2 \Delta m_{32}^2 + s_{13} \cos \delta \Delta m_{21}^2$$

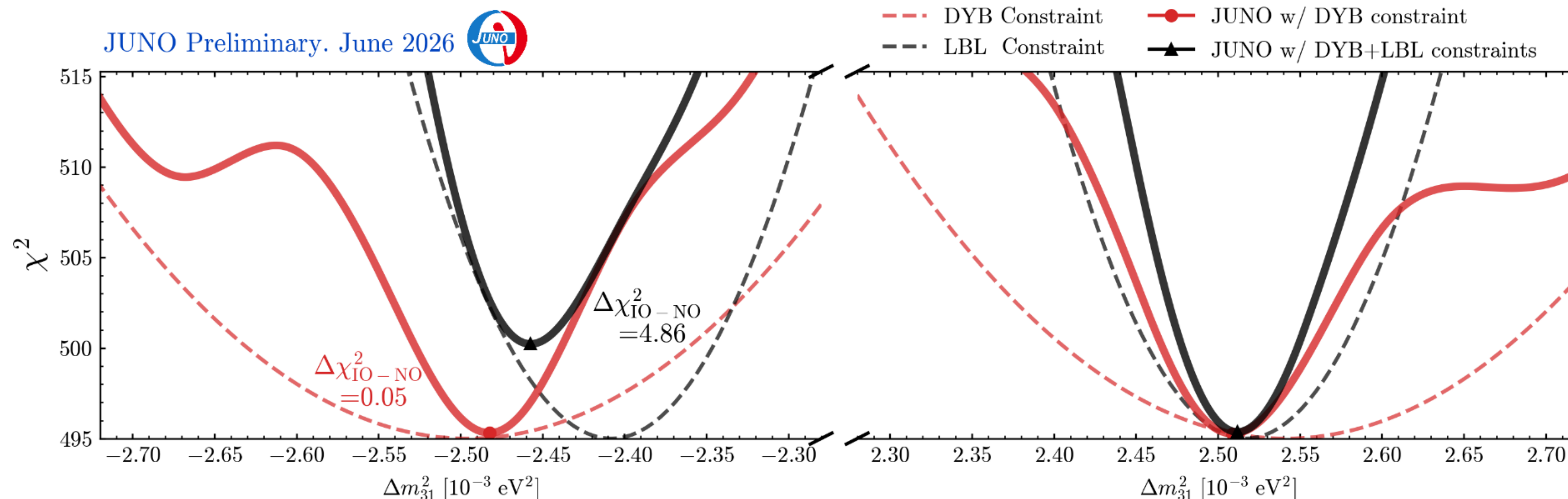
# Disappearance:

## Adding Constraint from NuFit-LBL

Posters: 252, 205



- ◆  $\Delta m_{31}^2$  from reactor and accelerator neutrinos should align at the right mass ordering[1]
- ◆ Adopt the NuFit-LBL results from [2]: normal mass ordering is favored at  $\Delta\chi^2 = 4.86$

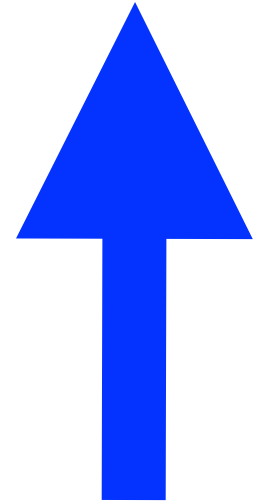
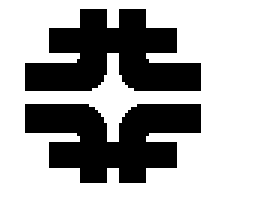


[1] H. Nunokawa, S. Parke and R.Z. Funchal, Phys. Rev. D 72 (2005) 013009; Y. F. Li et al., Phys. Rev. D 88, 013008 (2013)

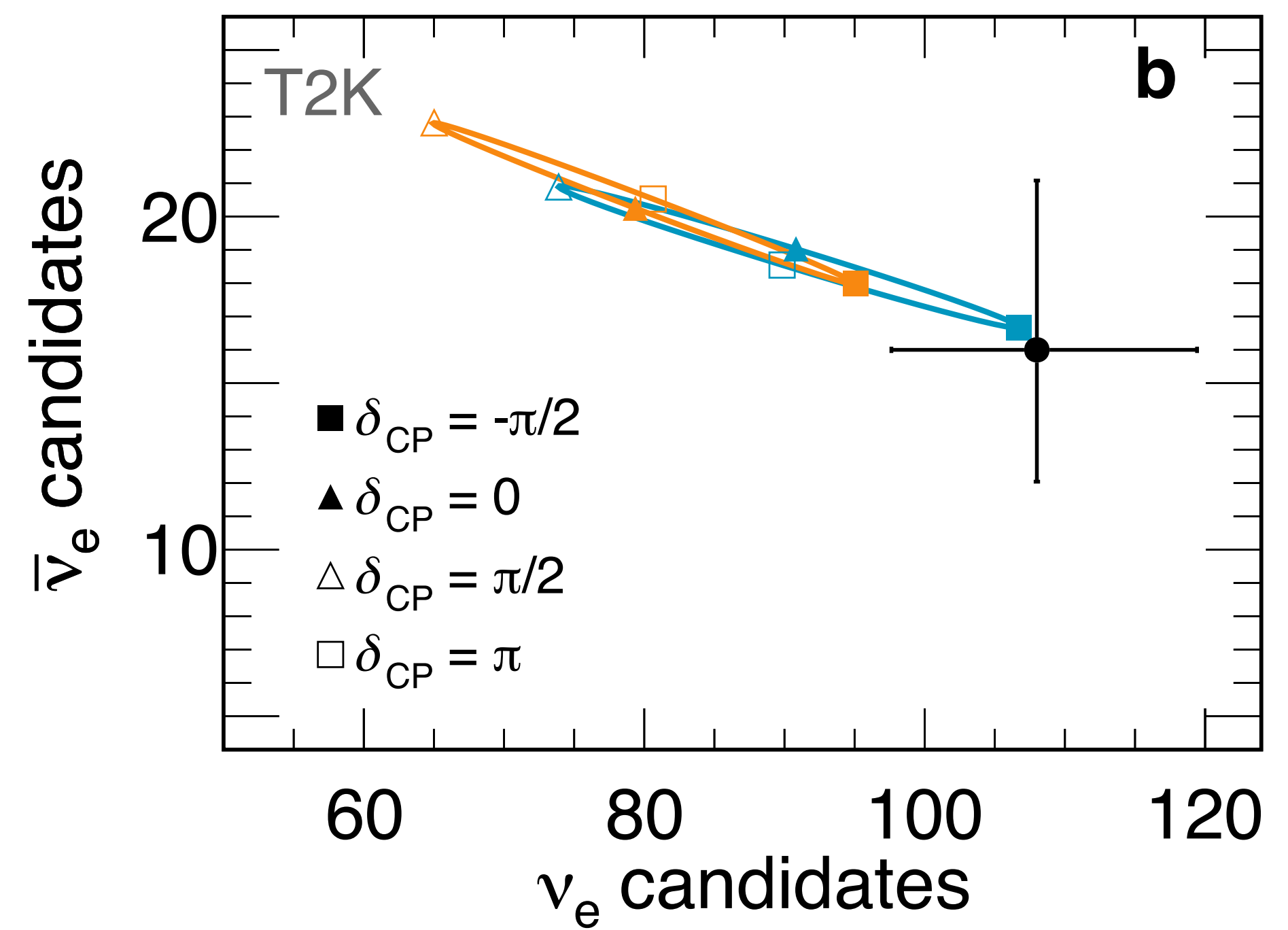
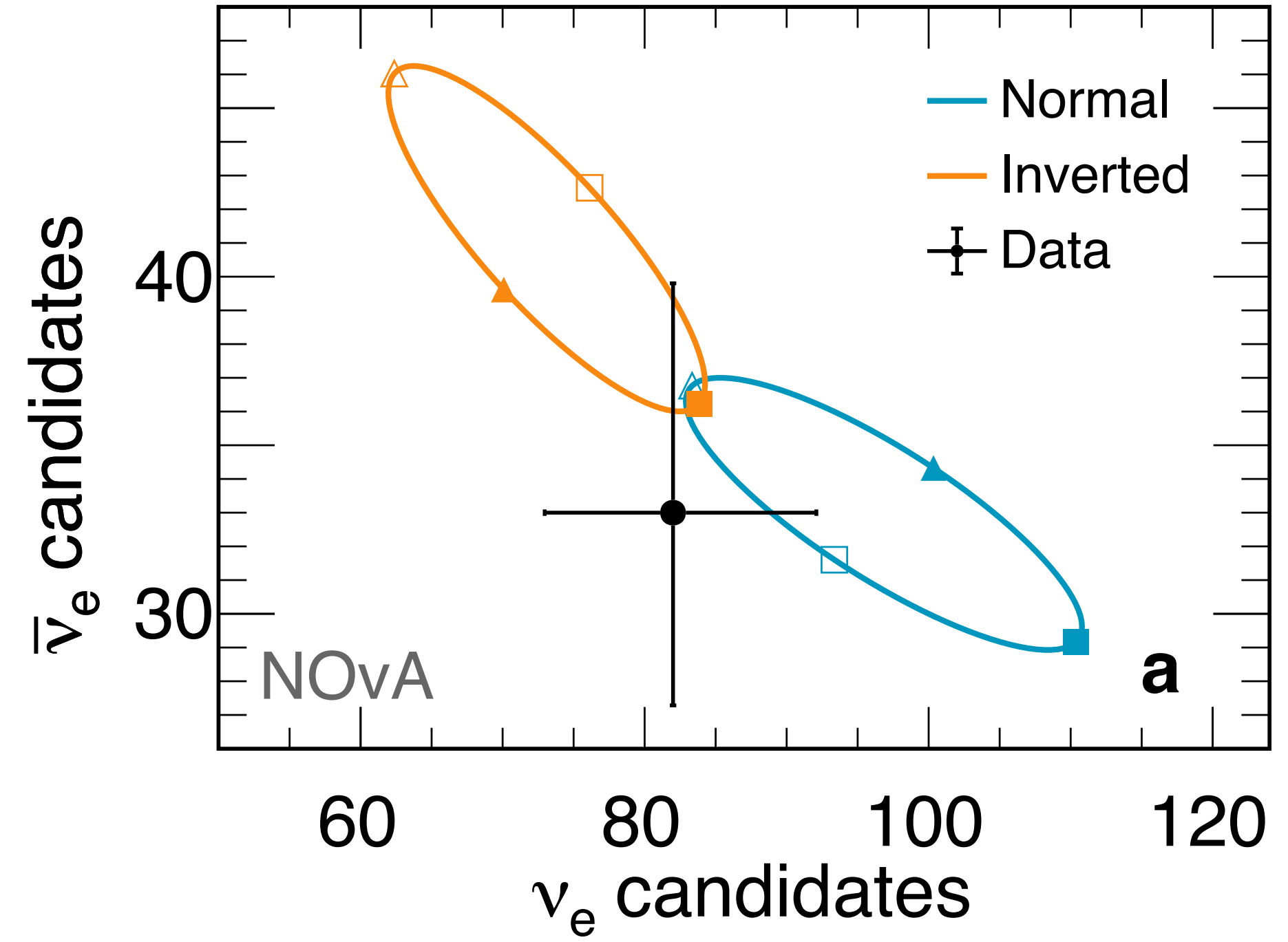
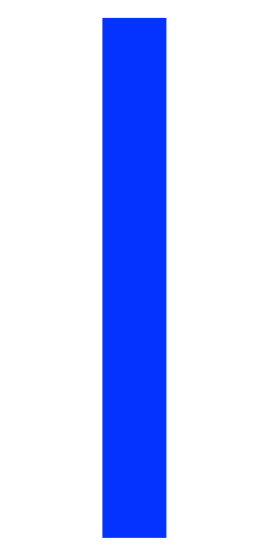
[2] NuFIT 6.0 (JHEP 12 (2024) 216 [arXiv:2410.05380]), [www.nu-fit.org](http://www.nu-fit.org) and M. Maltoni private communication



# Appearance: NOvA + T2K in Nature:



$P(\bar{\nu}_\mu \rightarrow \bar{\nu}_e)$



$\langle \Delta_{31} \rangle \approx 0.4 \pi \quad aL \approx 0.21$

$\langle \Delta_{31} \rangle \approx 0.5 \pi \quad aL \approx 0.07$

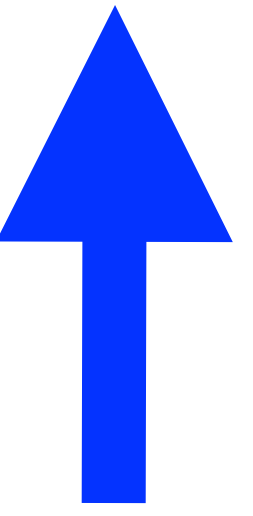
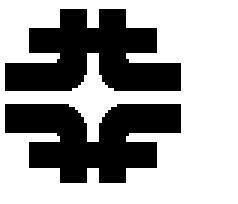
NOvA NO prefer by  $\sim 1$  unit of  $\chi^2$

T2K NO prefer by  $\sim 2$  units of  $\chi^2$

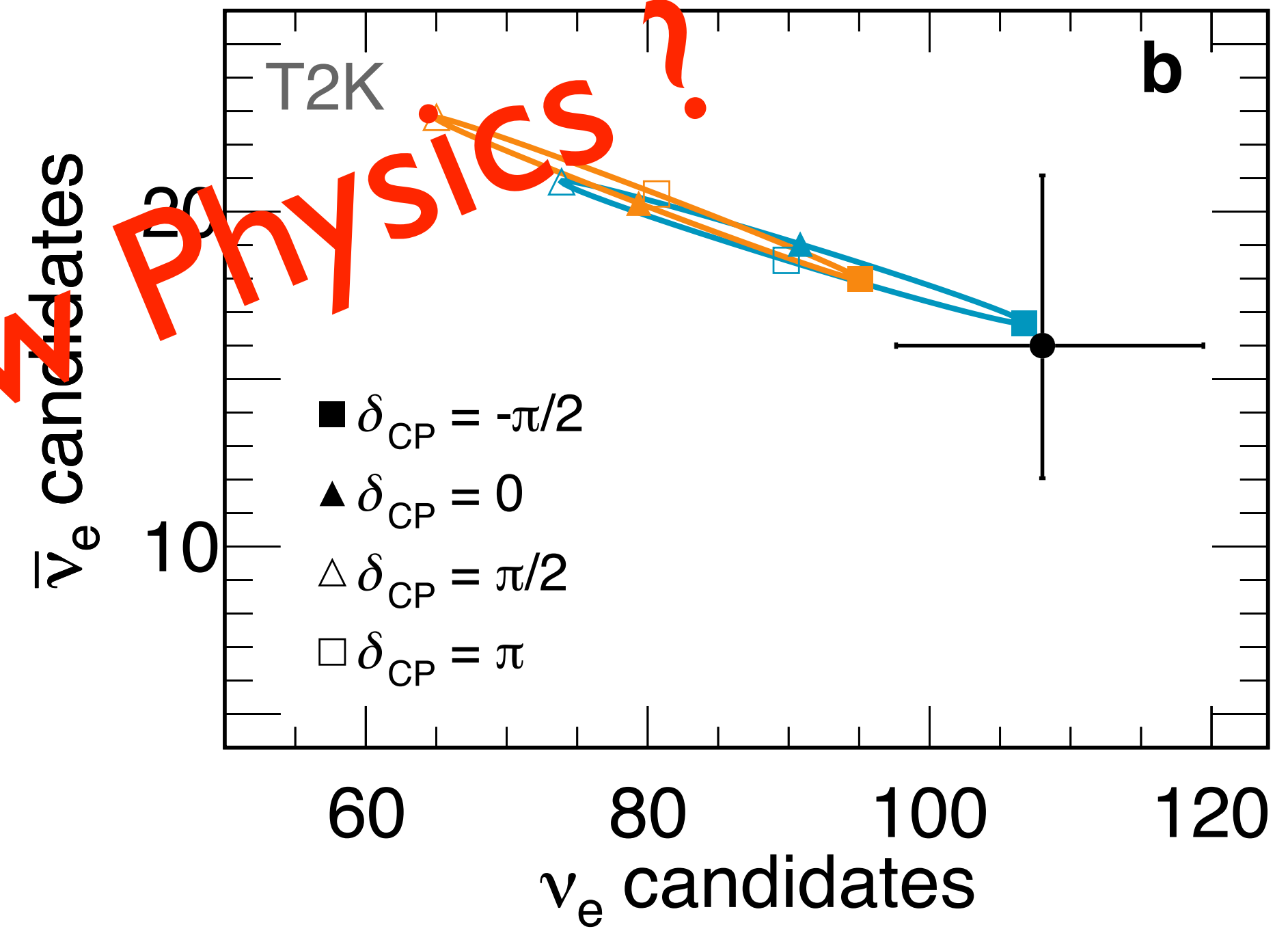
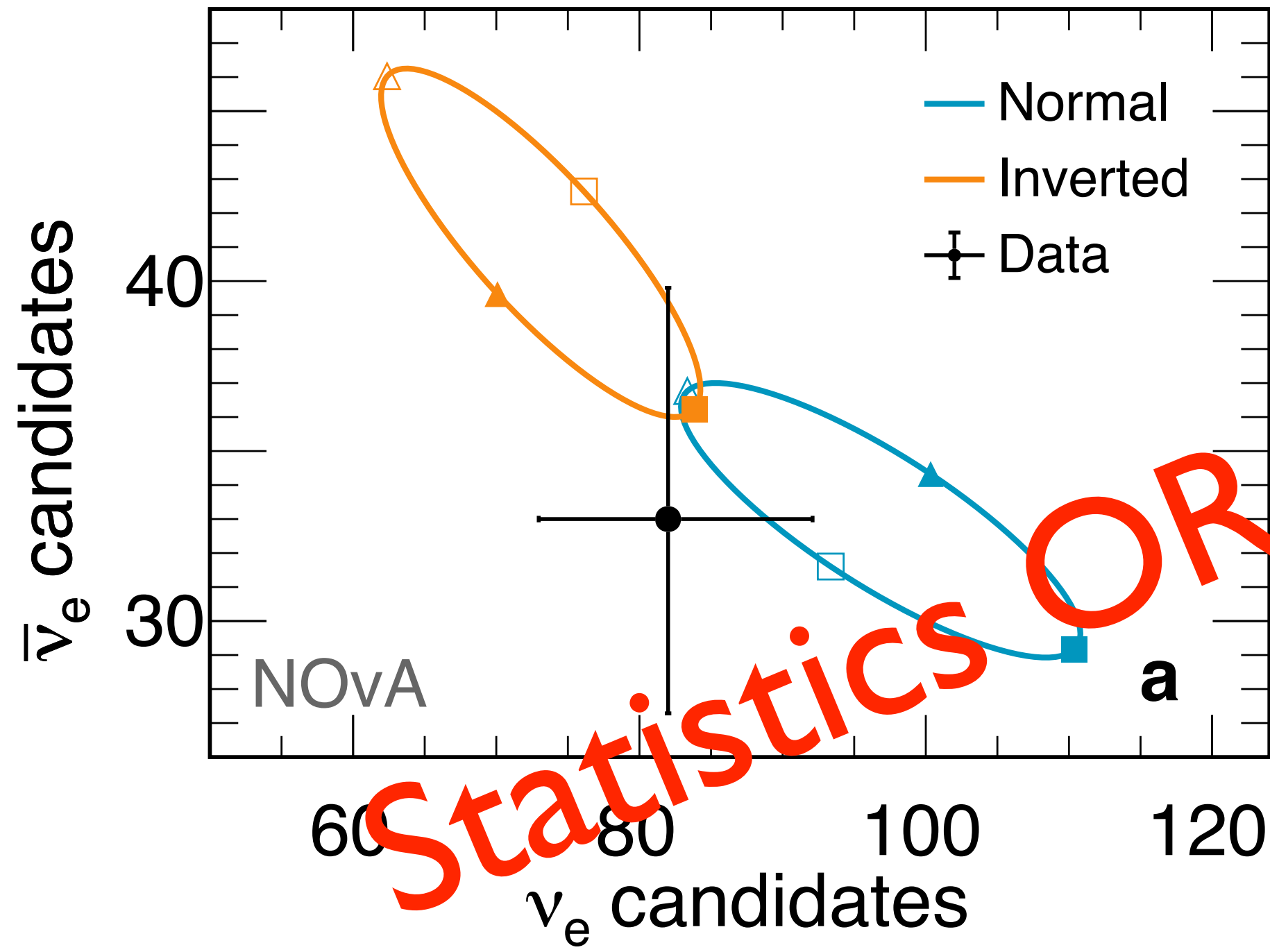
But at different values of  $\delta_{CP}$  !



# Appearance: NOvA + T2K in Nature:



$P(\bar{\nu}_\mu \rightarrow \bar{\nu}_e)$



Statistics OR New Physics?

$\langle \Delta_{31} \rangle \approx 0.4 \pi \quad aL \approx 0.21$

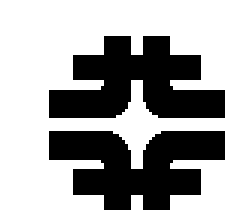
$\langle \Delta_{31} \rangle \approx 0.5 \pi \quad aL \approx 0.07$

NOvA NO prefer by  $\sim 1$  unit of  $\chi^2$

T2K NO prefer by  $\sim 2$  units of  $\chi^2$

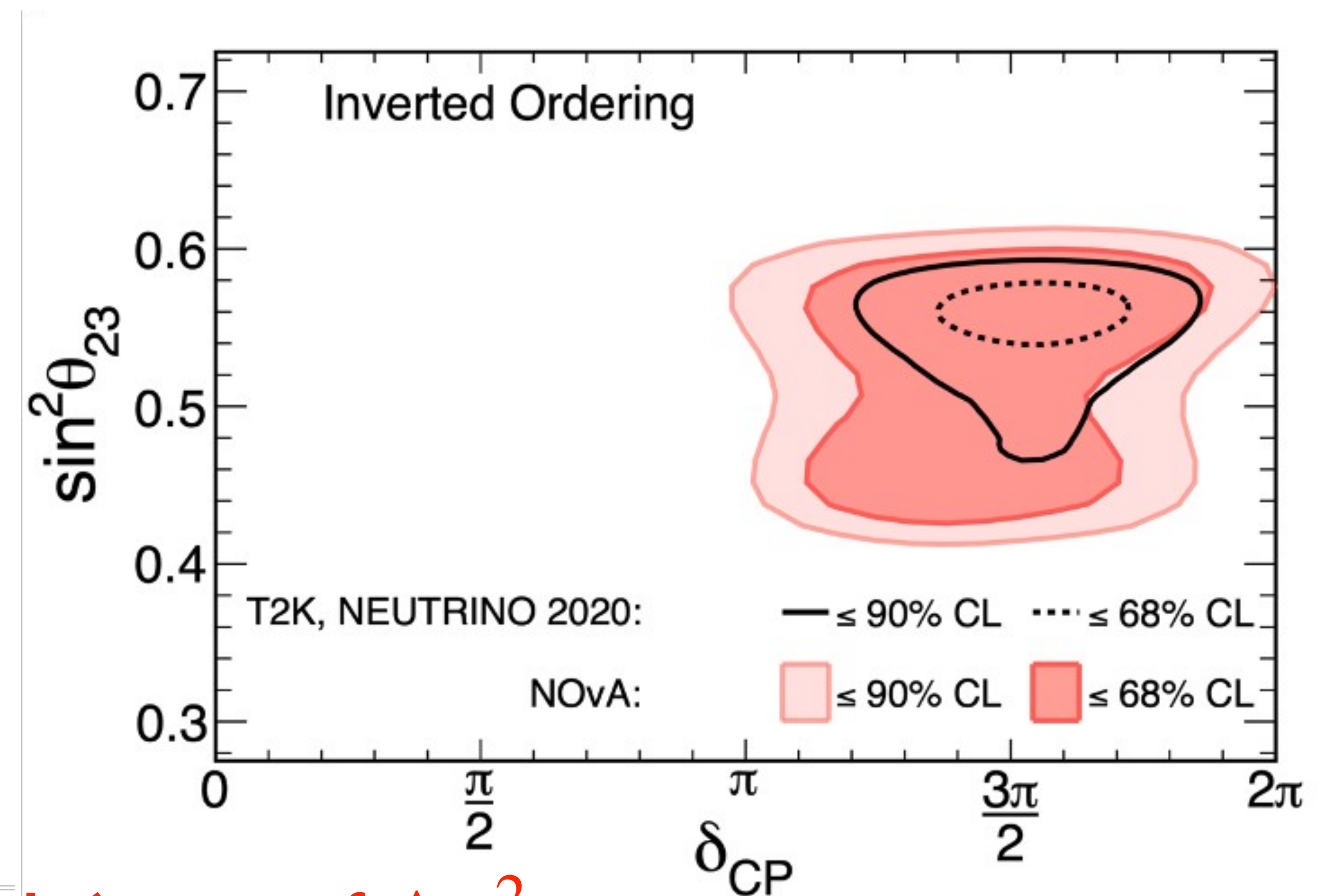
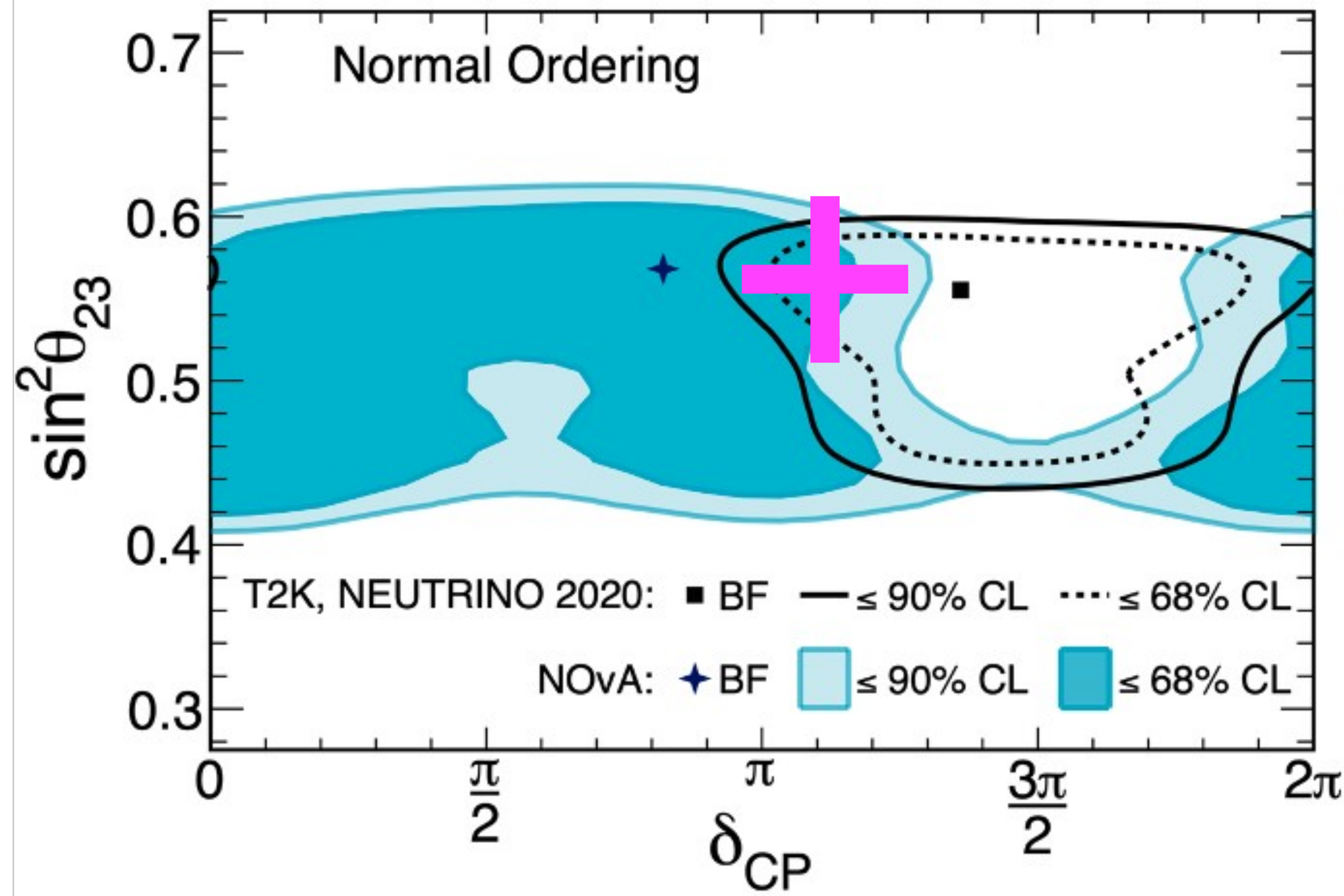
But at different values of  $\delta_{CP}$  !

$P(\nu_\mu \rightarrow \nu_e)$



# COMBINED

<https://doi.org/10.5281/zenodo.6683827>



IO prefer by  $\sim 1.6$  unit of  $\Delta\chi^2$

## Statistics OR New Physics ?

Kelly, Machado, SP, Perez, Zukanovich 2007.08526 plus other papers