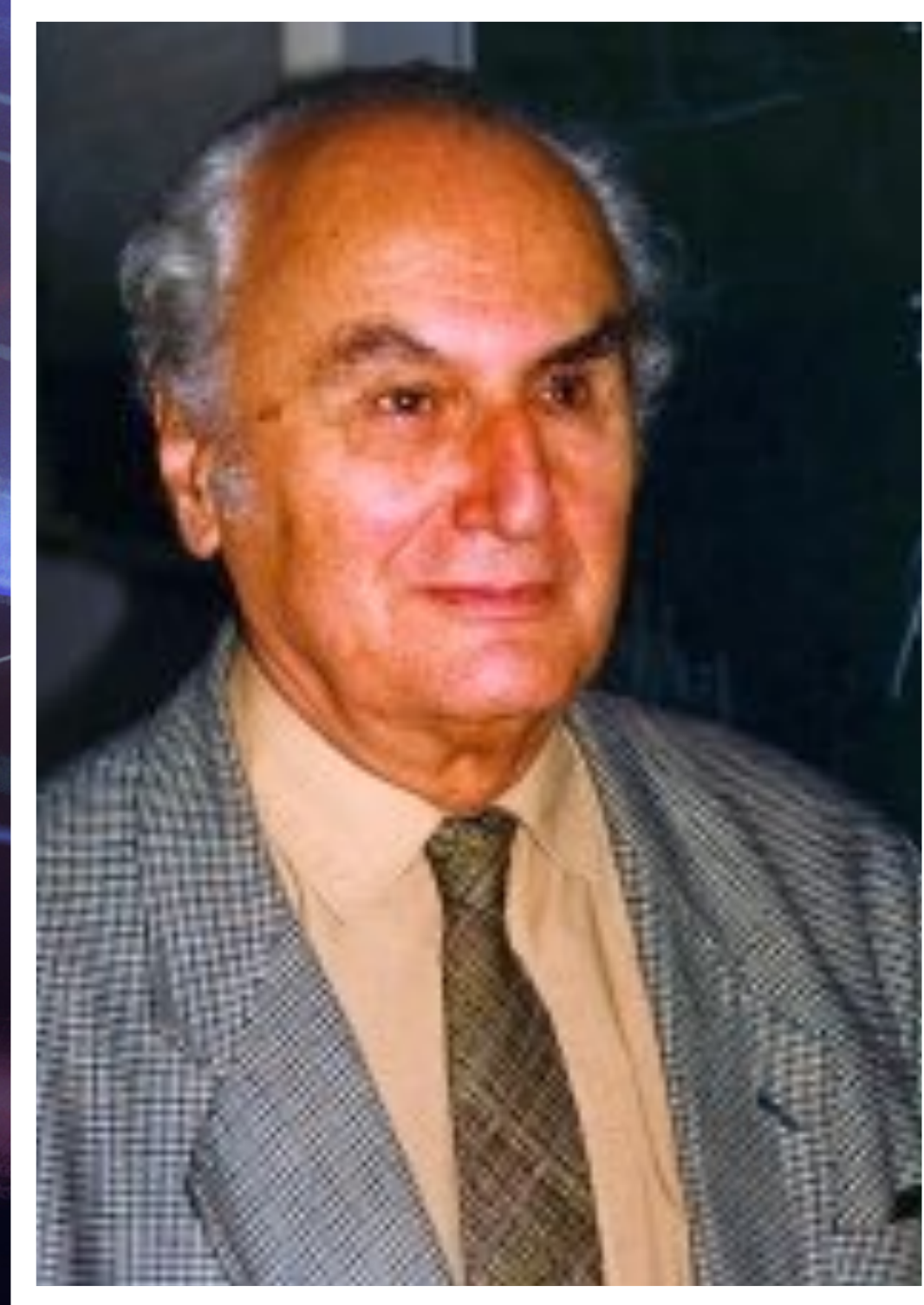


# International Neutrino Committee (INC)\* Report:

Stephen  
Parke  
Fermilab

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

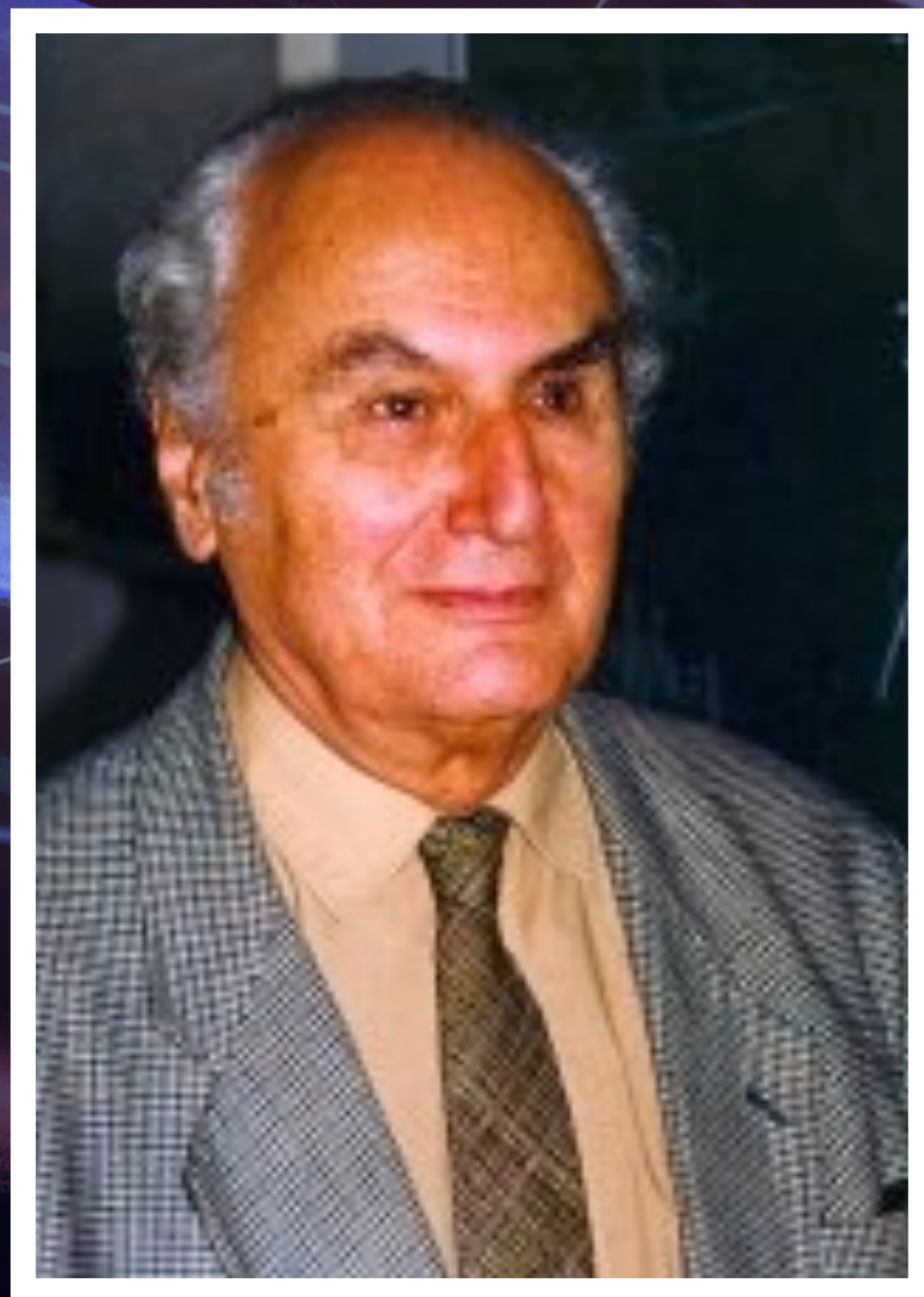
$\nu_e$  INC Chair  
2016- ..



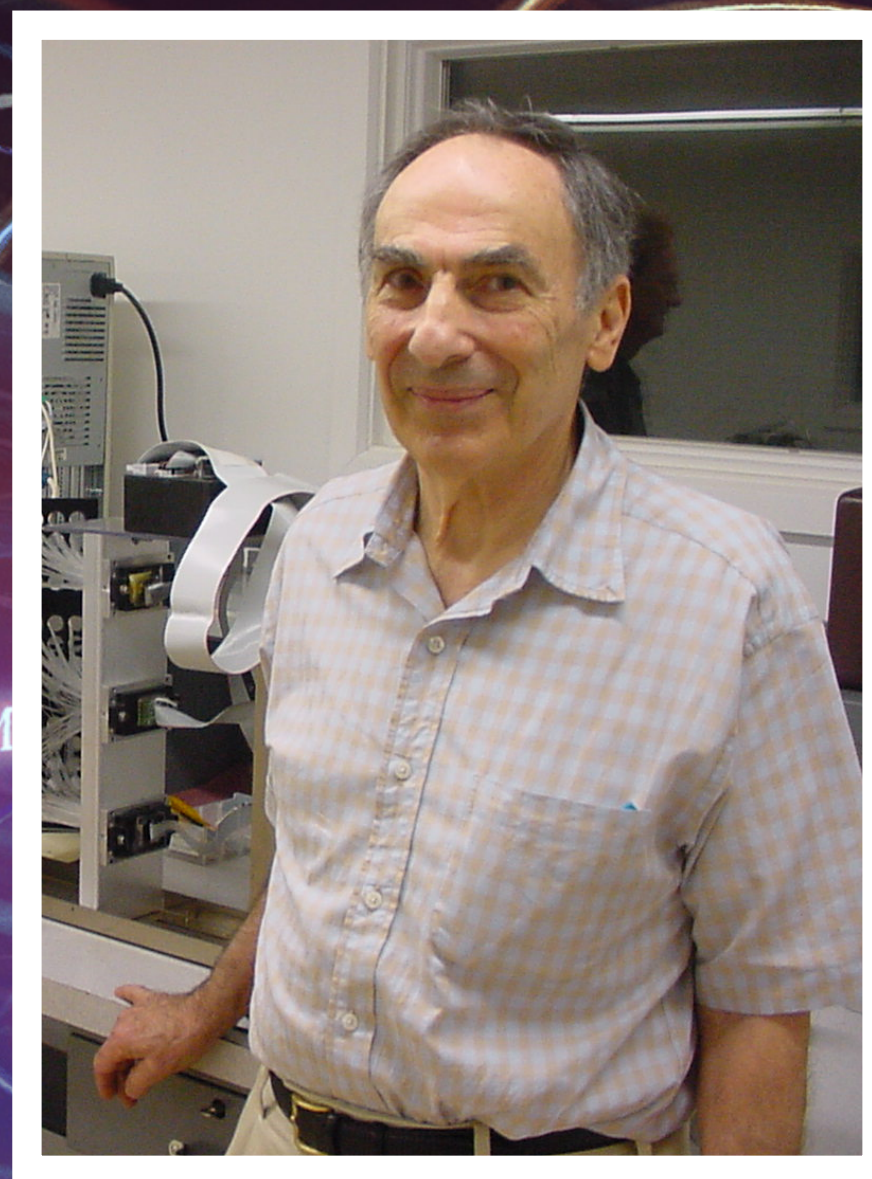
George Marx  
Nu 1972, Hungary  
Chair 1972-2002

\*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- ..

\*INC consists of all passed chairs of Neutrino Conference

# INTERNATIONAL NEUTRINO COMMISSION

*Former conference chairs and thereby custodians of the Neutrino conference series*

---

**Cecilia Jarlskog**

Bergen, Norway, 1979

**Ettore Fiorini**

Erice, Italy, 1980, deceased

**John Learned**

Wailea, USA, 1981

**Konrad Kleinknecht**

Dortmund, West Germany,  
1984

**Arnon Dar**

Eliat, Israel, 1994

**Yoichiro Suzuki**

Takayama, Japan, 1998

**Art McDonald**

Sudbury, Canada, 2000

**Franz von Feilitzsch**

Munich, Germany, 2002

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**Francois Vannucci**

**Daniel Vignaud**

Paris, France, 2004

**Thomas Bowles**

**William Louis**

Santa Fe, USA, 2006

**Jenni Adams**

**Francis Halzen**

**Stephen Parke (chair)**

Christchurch, New Zealand,  
2008

**Takashi Kobayashi**

**Masayuki Nakahata**

**Tsuyoshi Nakaya**

Kyoto, Japan, 2012

**Gary Feldman**

**Ed Kearns**

Boston, USA, 2014

**Kenneth Long**

**Silvia Pascoli**

London, UK, 2016

**Guido Drexlin**

**Manfred Lindner**

Heidelberg, Germany, 2018

**Steve Brice**

**Marvin Marshak**

**Sam Zeller**

Chicago, USA, 2020

**Yeongduk Kim**

**Seon-Hee Seo**

Seoul, South Korea, 2022

**Herbert Pietschmann**

WIN

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**Chiara Brofferio**  
**U. Milano - Bicocca**



**Gioacchino Ranucci**  
**INFN - Milano**

- **Nu 2024: June 16 to June 22**



**Milano, Italy**

# Local Organizing Committee

**Vito Antonelli**

INFN Milano

**Silvia Capelli**

University of Milano – Bicocca

**Luca Gironi**

University of Milano – Bicocca

**Luca Origo**

University of Milano – Bicocca

**Davide Basilico**

University of Milano

**Paolo Carniti**

University of Milano – Bicocca

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**Massimo Girola**

University of Milano – Bicocca

**Irene Nutini**

INFN Milano – Bicocca

**Valerio Toso**

University of Milano

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UC Irvine

**I. Bartos**

University of Florida

**N. Bowden**

Lawrence Livermore National  
Laboratory

**C. Buck**

MPG Heidelberg

**M. C. Chen**

UC Irvine

**M. Friend**

KEK

**L. Gastaldo**

University of Heidelberg

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CIEMAT

**M. Gonzales-Garcia**

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Ghent University

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Instituto de Física Corpuscular

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Université de Geneve

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UC Irvine

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**G. Pagliaroli**

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**L. Patrizii**

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Niels Bohr Institute

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Università Roma Sapienza

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University of Oxford

**H. Watanabe**

Tohoku University

**H. T. Wong**

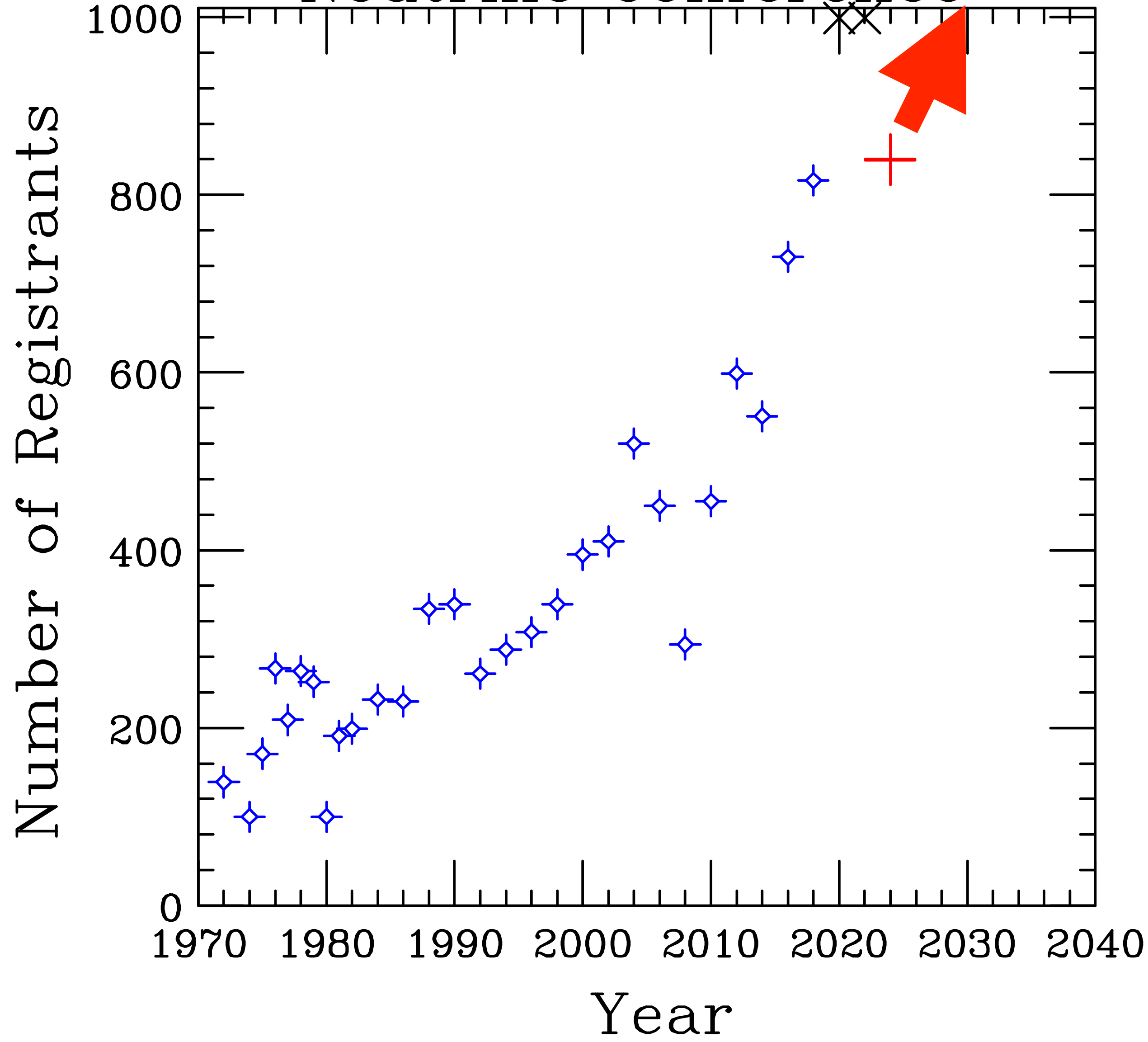
Academia Sinica, Taipei

**M. Wurm**

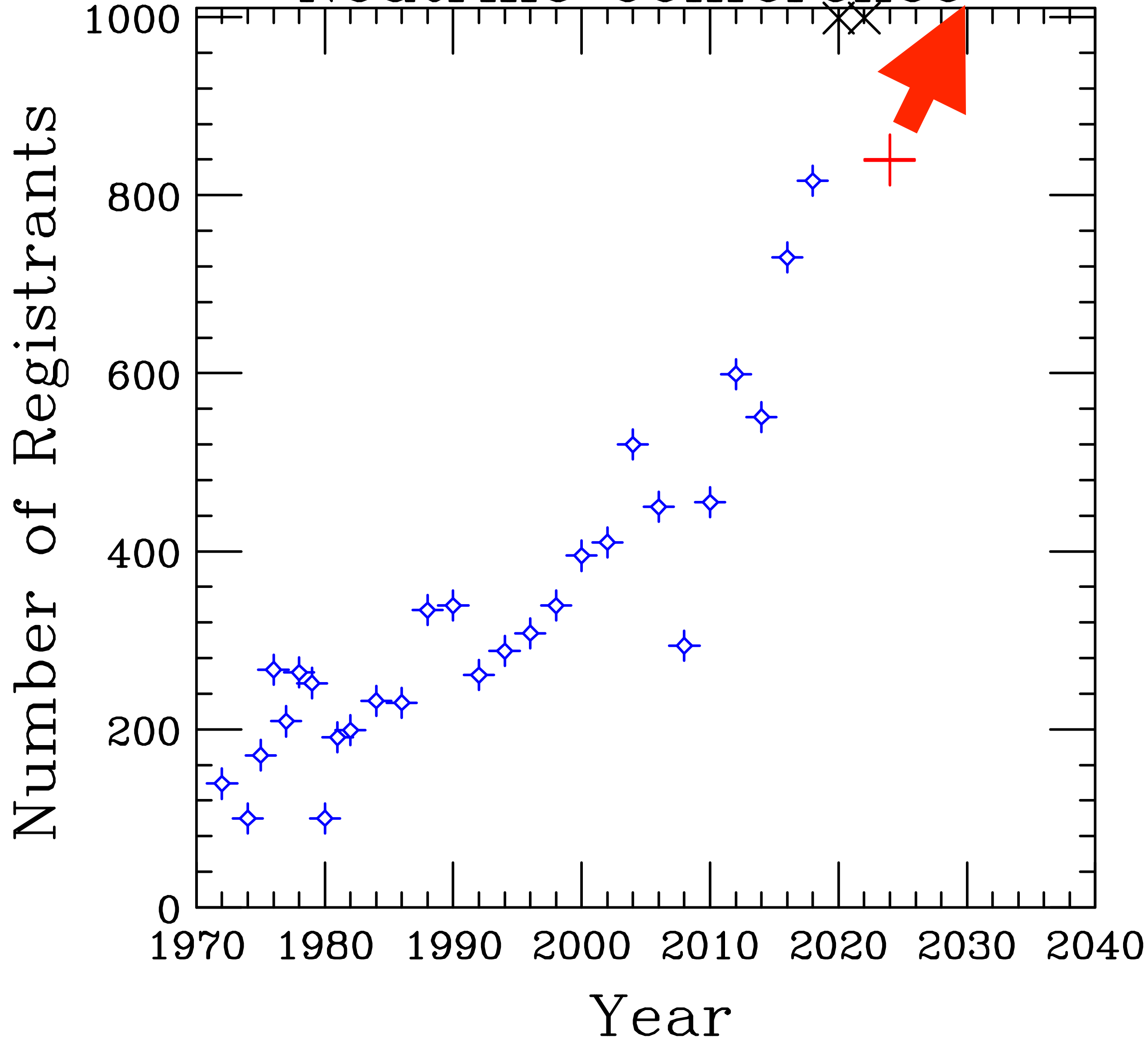
University of Mainz



# Neutrino Conference

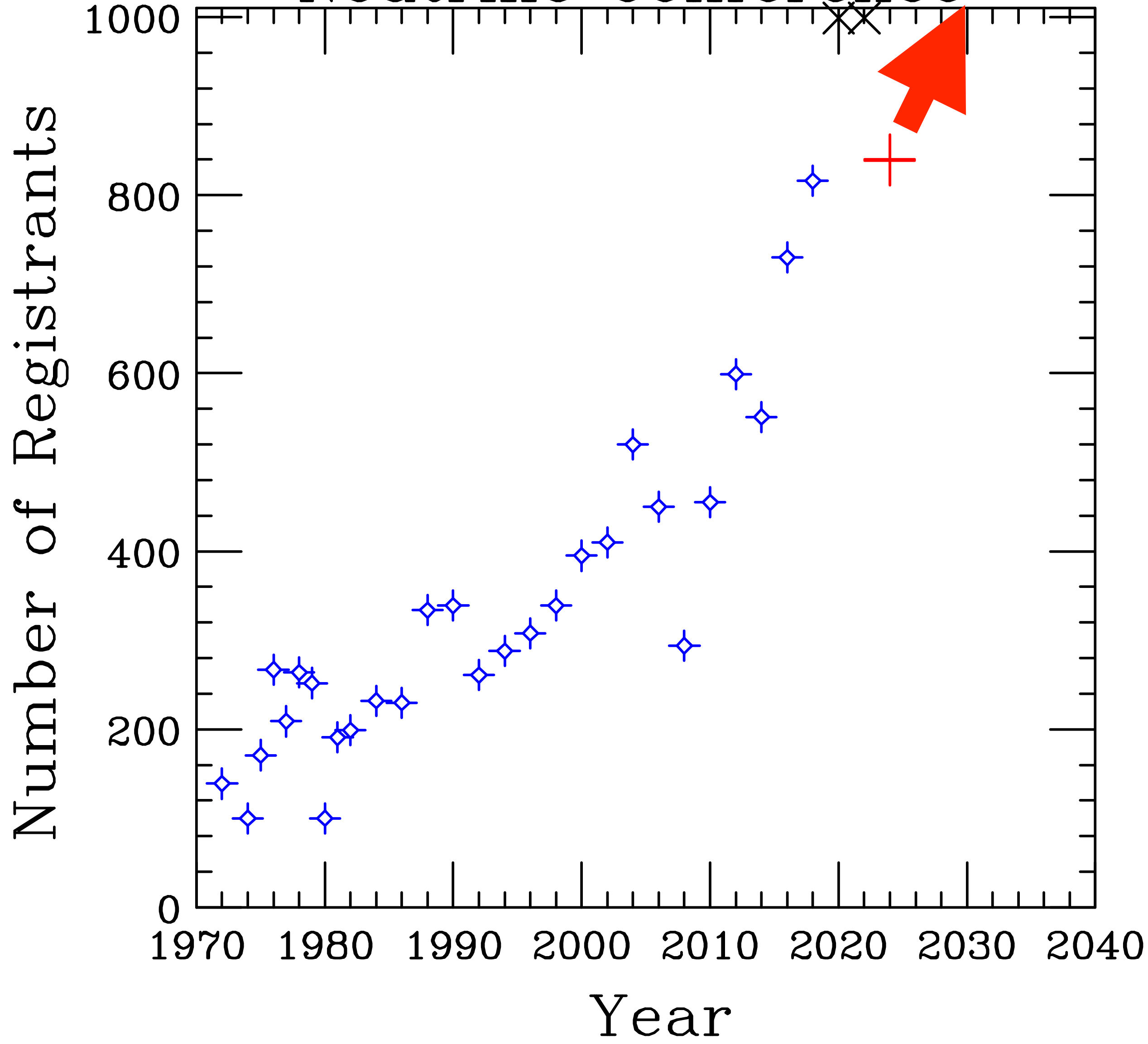


# Neutrino Conference



261 registered as 'students' 31%  
570 registered as 'researchers'  
8 registered as 'companies'

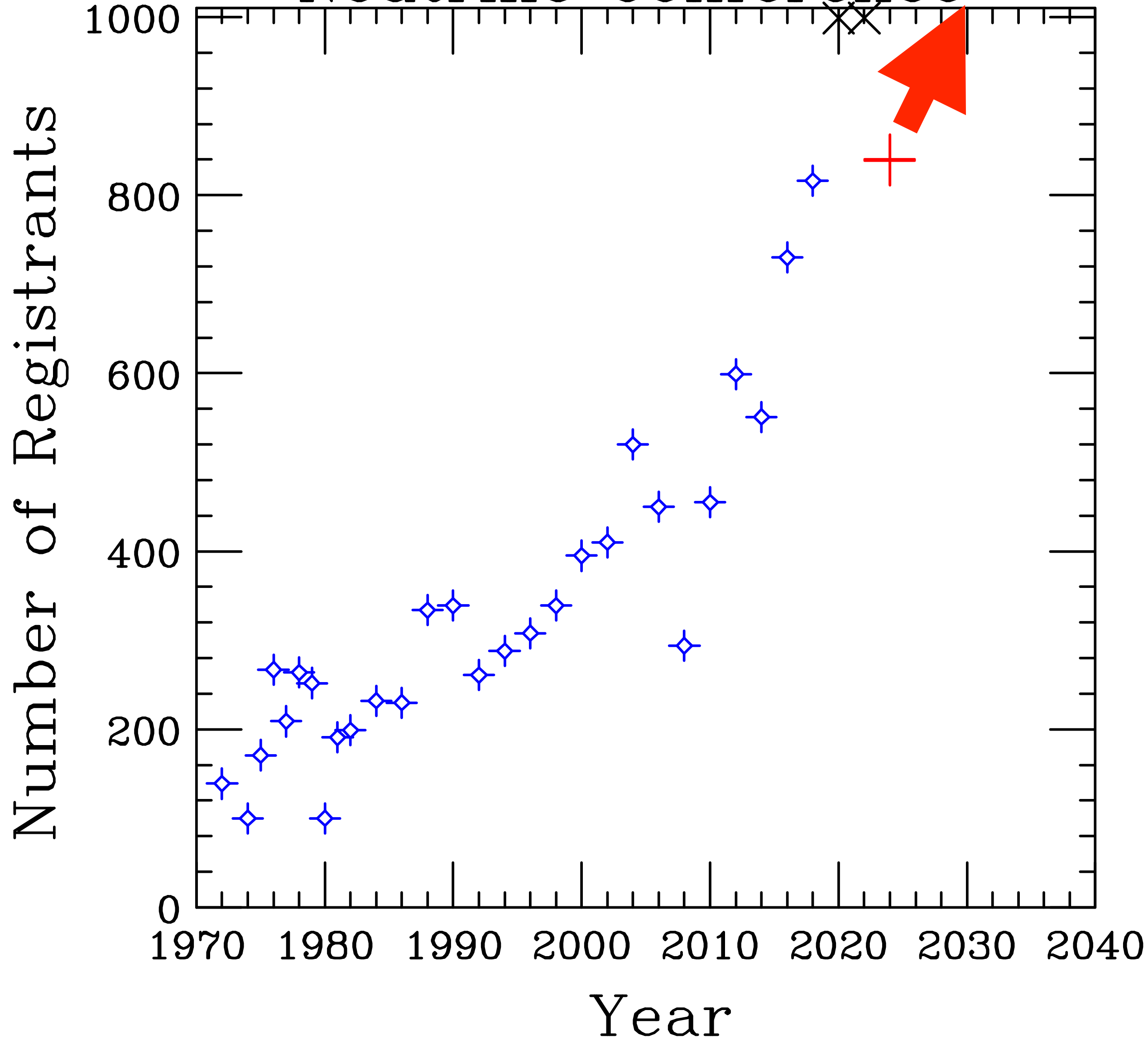
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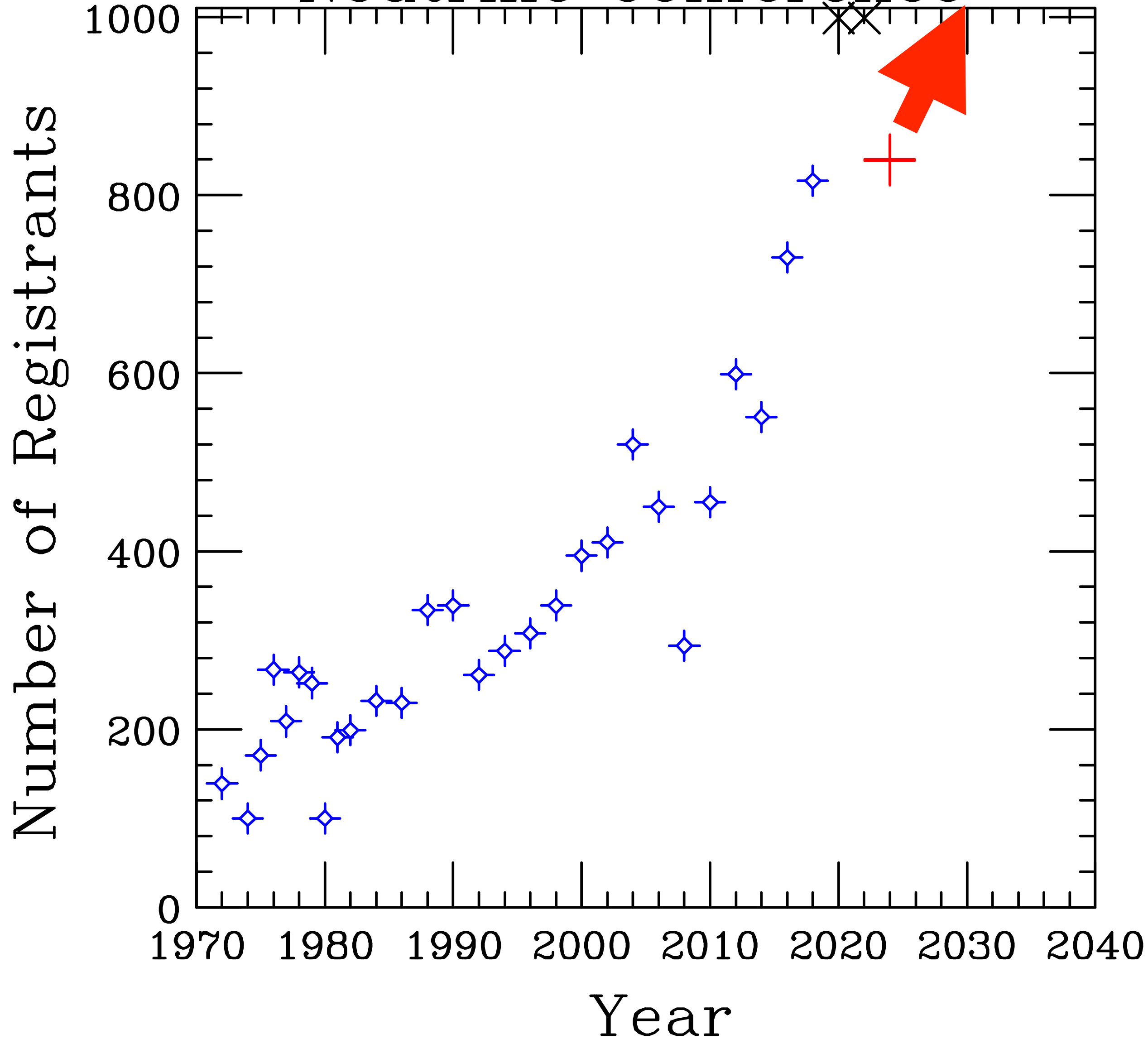


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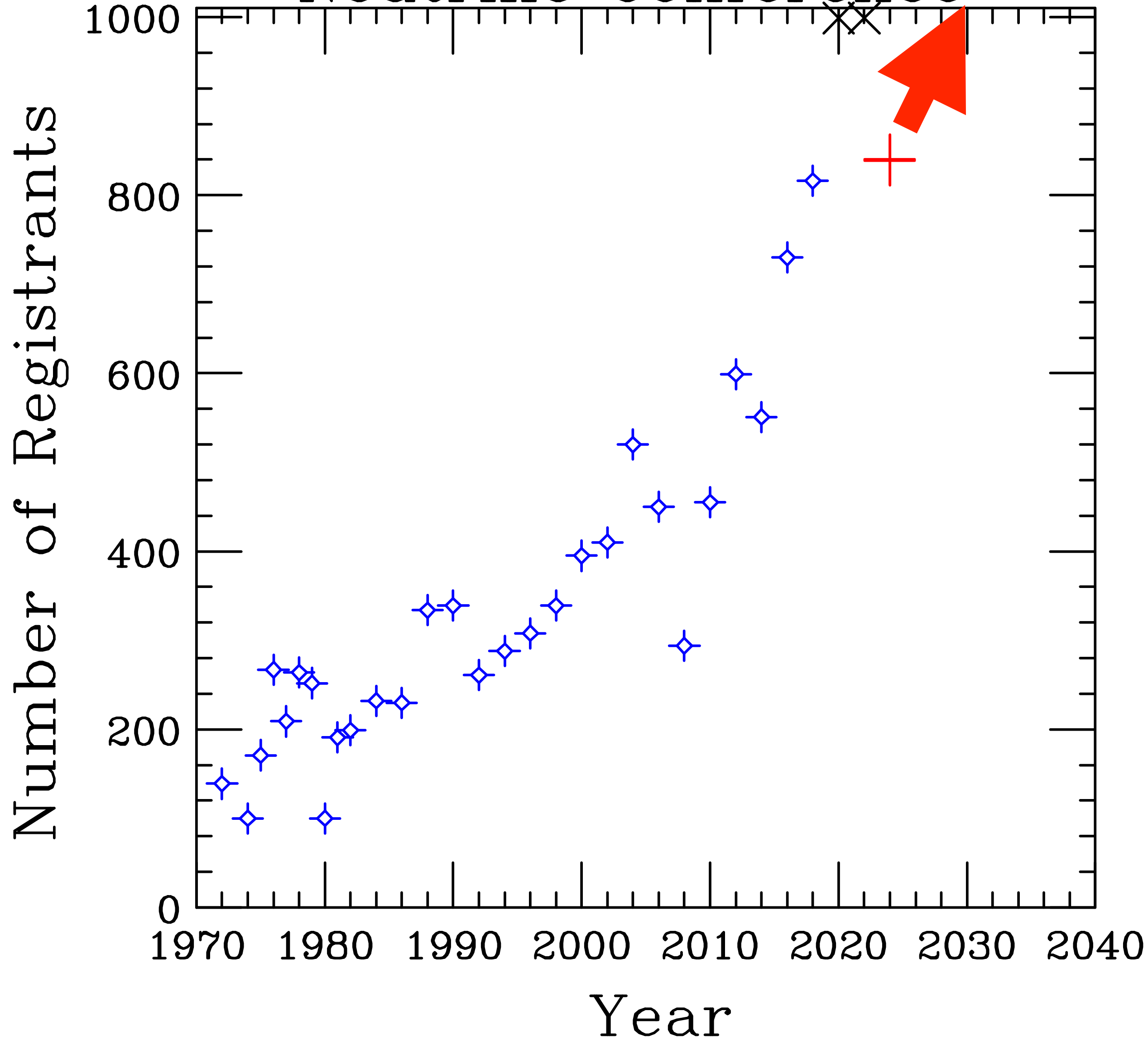
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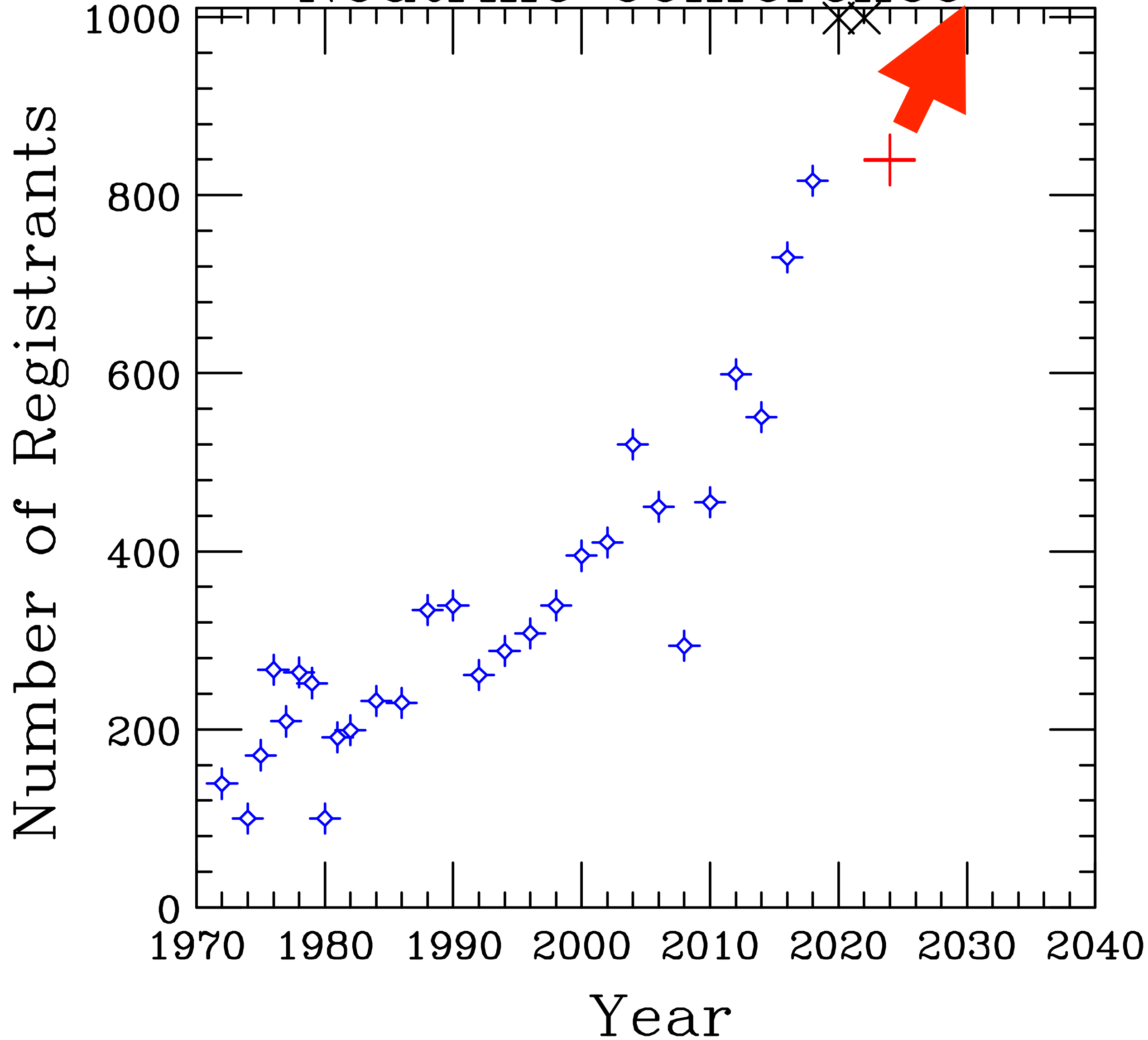
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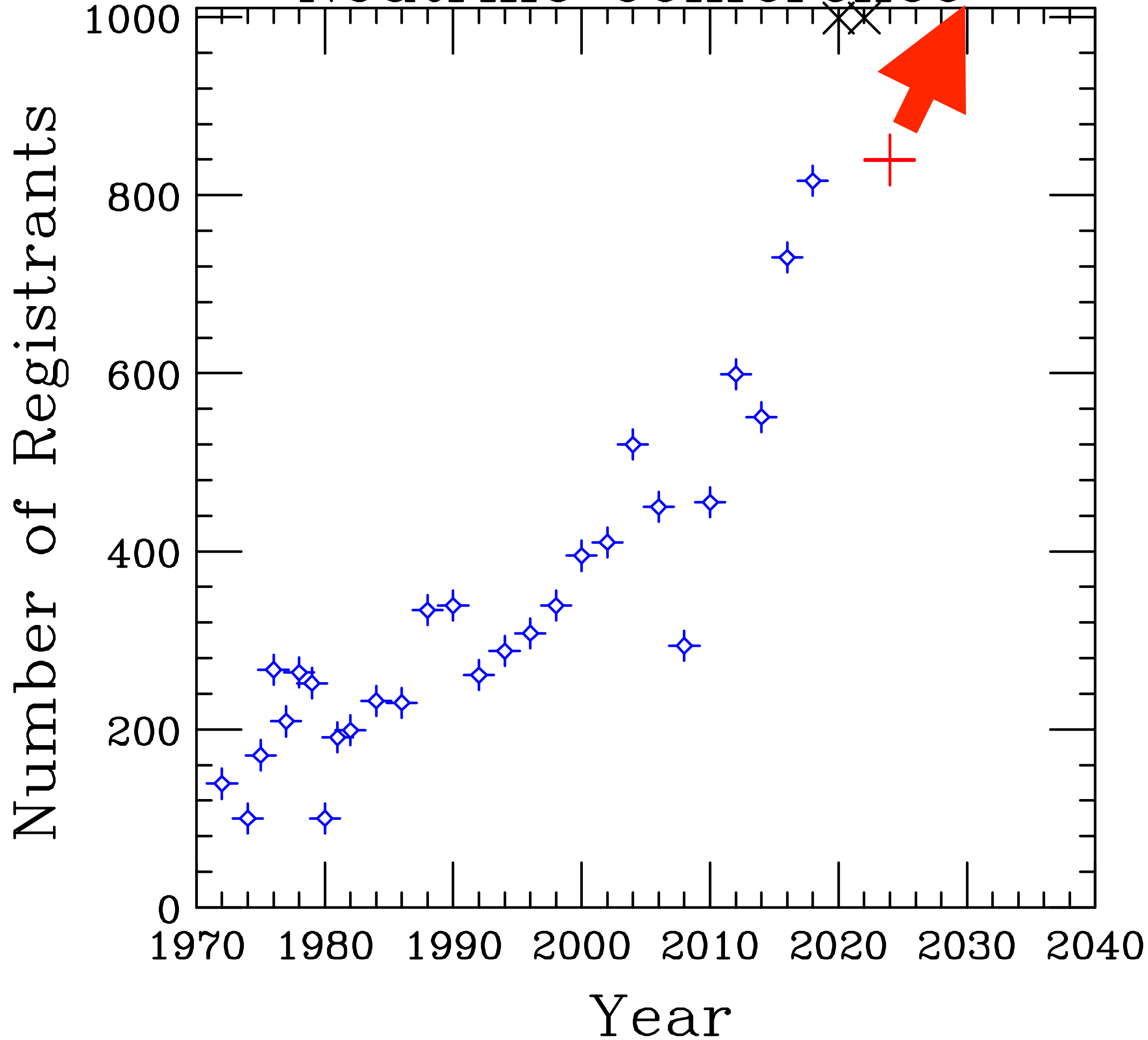
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**~ 30% of participants where female**

**25% talks by female speakers**

**Goal is = or > ?**

**Why ?**

**The Exp. Collaborations  
suggested names  
where only 19 % female !**



# Discussions of Neutrinos over



# PMNS Standard Convention:

$$\begin{pmatrix} \nu_e \\ \nu_\mu \\ \nu_\tau \end{pmatrix} = \underbrace{\begin{pmatrix} 1 & 0 & 0 \\ 0 & \cos \theta_{23} & \sin \theta_{23} \\ 0 & -\sin \theta_{23} & \cos \theta_{23} \end{pmatrix}}_{\text{Atmospheric}} \underbrace{\begin{pmatrix} \cos \theta_{13} & 0 & \sin \theta_{13} e^{-i\delta_{CP}} \\ 0 & 1 & 0 \\ -\sin \theta_{13} e^{i\delta_{CP}} & 0 & \cos \theta_{13} \end{pmatrix}}_{\text{Reactor}} \underbrace{\begin{pmatrix} \cos \theta_{12} & \sin \theta_{12} & 0 \\ -\sin \theta_{12} & \cos \theta_{12} & 0 \\ 0 & 0 & 1 \end{pmatrix}}_{\text{Solar}} \underbrace{\begin{pmatrix} e^{i\eta_1} & 0 & 0 \\ 0 & e^{i\eta_2} & 0 \\ 0 & 0 & 1 \end{pmatrix}}_{\text{Majorana}} \begin{pmatrix} \nu_1 \\ \nu_2 \\ \nu_3 \end{pmatrix} \quad \begin{array}{l} \text{Decreasing} \\ \nu_e \text{ content} \\ \downarrow \end{array}$$

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Decreasing  
 $\nu_e$  content



“easy to measure”

$$(U_{\alpha i}^2) = \begin{pmatrix} c_{13}^2 c_{12}^2 & c_{13}^2 s_{12}^2 & s_{13}^2 \\ \dots & \dots & c_{13}^2 s_{23}^2 \\ \dots & \dots & c_{13}^2 c_{23}^2 \end{pmatrix}$$

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Decreasing  $\nu_e$  content   
 ↓

"easy to measure"



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"easy to measure"

opposite signs needed for Unitarity



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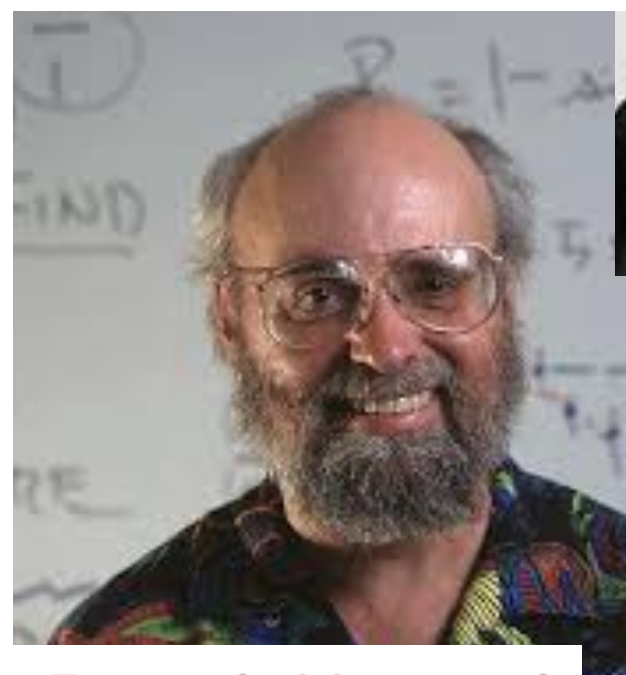
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Munich 2002



**Masavuki Nakahata**  
Kyoto, Japan, 2012



# INC @ Nu 2024

**Tuesday**  
**lunch (presentations)**  
**evening (discussions)**

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



**Francis Halzen + Stephen Parke**  
Christchurch, NZ, 2008

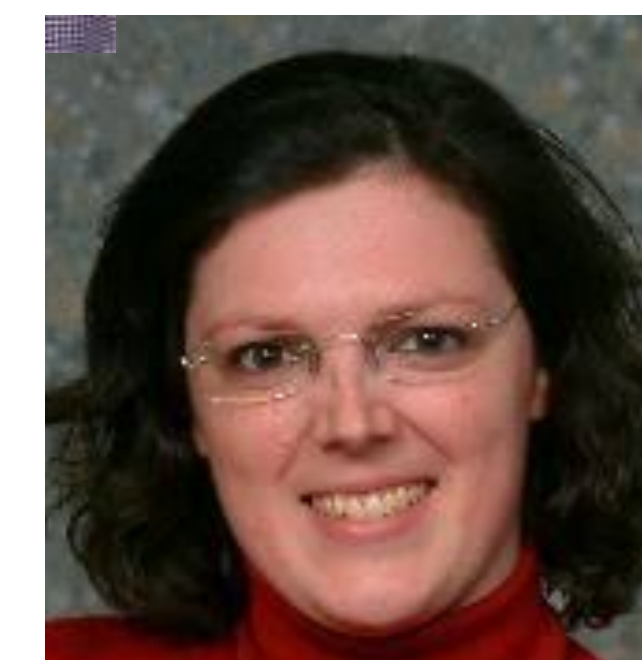


**Chiara Brofferio + Gioacchino Ranucci**

Milan, Italy, 2024



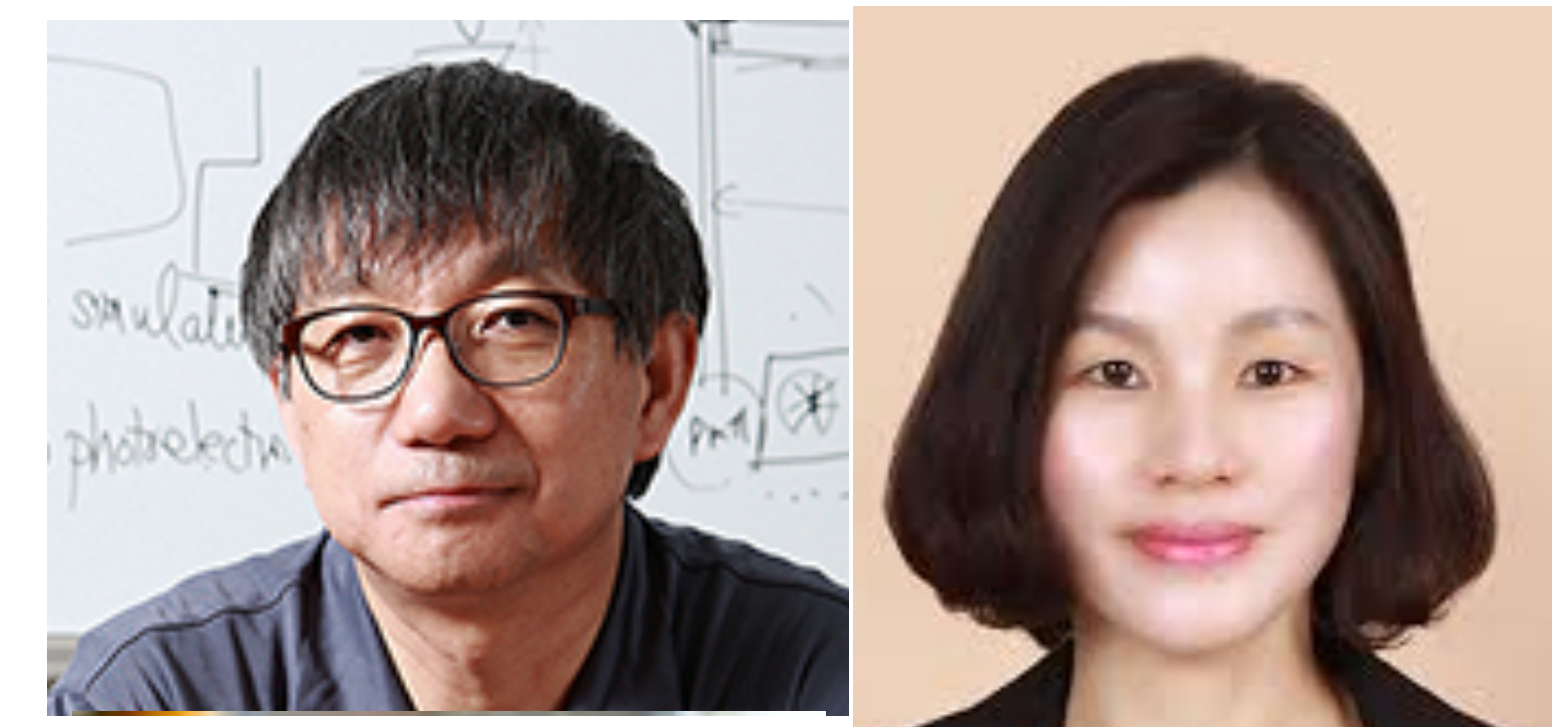
**Silvia Pascoli**  
London, UK, 2016



**Manfred Lindner + Guilin Drexlin**  
Heidelberg 2018



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



# Neutrino Conference Format:



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

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

**What about  
Neutrino 2026 ?**

# Neutrino 2026 at UC Irvine



Mu-Chun Chen, Co-Chair



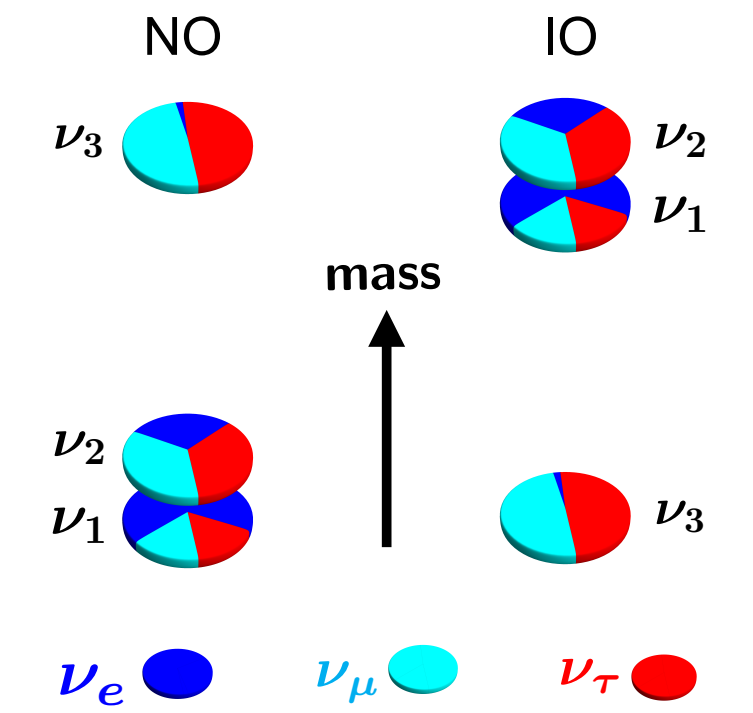
Michael Smy, Co-Chair

**Date and Venue to be determined by  
October 1st, 2024**

<https://sites.uci.edu/neutrino2026/>

Another possible way to determine  
the Neutrino Mass Hierarchy

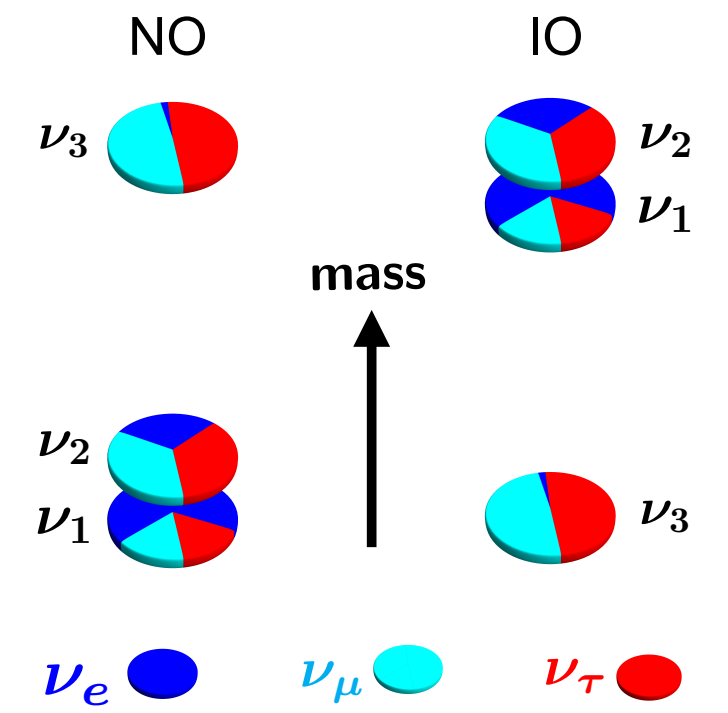
Hiroshi Nunokawa<sup>1,\*</sup> Stephen Parke<sup>2,†</sup> and Renata Zukanovich Funchal<sup>3‡</sup>



**T2K + NOVA + JUNO**  
**@ Nu 2026**  
**MO at  $3\sigma$**

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Hiroshi Nunokawa<sup>1,\*</sup> Stephen Parke<sup>2,†</sup> and Renata Zukanovich Funchal<sup>3‡</sup>



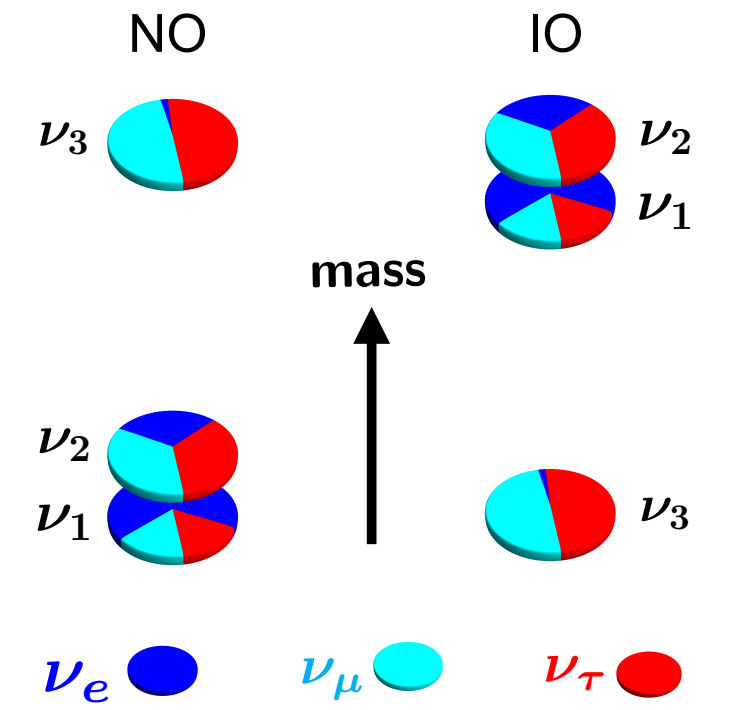
$\Delta m_{atm}^2$  from  $\nu_\mu$  and  $\nu_e$  disappearance are  
INCONSISTENT at 2 - 4 % level for the WRONG MO !

T2K + NOVA + JUNO  
@ Nu 2026  
MO at  $3\sigma$

**T2K + NOvA + JUNO**  
**@ Nu 2026**  
**MO at 3 $\sigma$**

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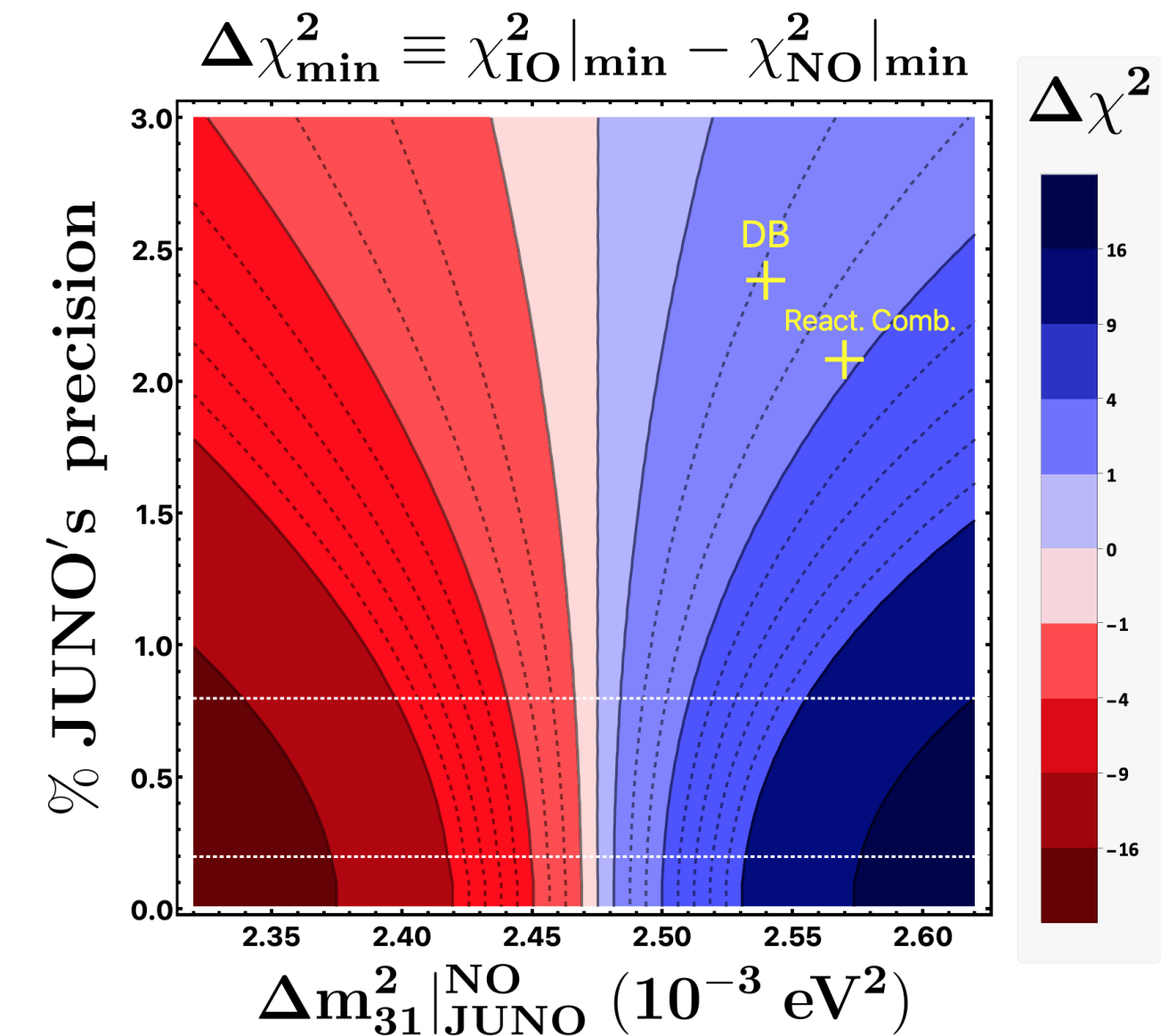


$\Delta m_{atm}^2$  from  $\nu_\mu$  and  $\nu_e$  disappearance are  
**INCONSISTENT** at 2 - 4 % level for the **WRONG MO** !

## A Mass Ordering Sum Rule for the Neutrino Disappearance Channels in T2K, NOvA and JUNO

arXiv:2404.08733

$$\begin{aligned}
 & \left( \Delta m_{31}^2 \Big|_{\text{LBL}}^{\text{NO}} - \Delta m_{31}^2 \Big|_{\text{JU}}^{\text{NO}} \right) + \left( \left| \Delta m_{32}^2 \Big|_{\text{JU}}^{\text{IO}} - \left| \Delta m_{32}^2 \Big|_{\text{LBL}}^{\text{IO}} \right. \right) \\
 & \approx (3.1 - 0.9 \widehat{\cos \delta}) \% \left| \Delta m_{atm}^2 \right|. \quad (9)
 \end{aligned}$$



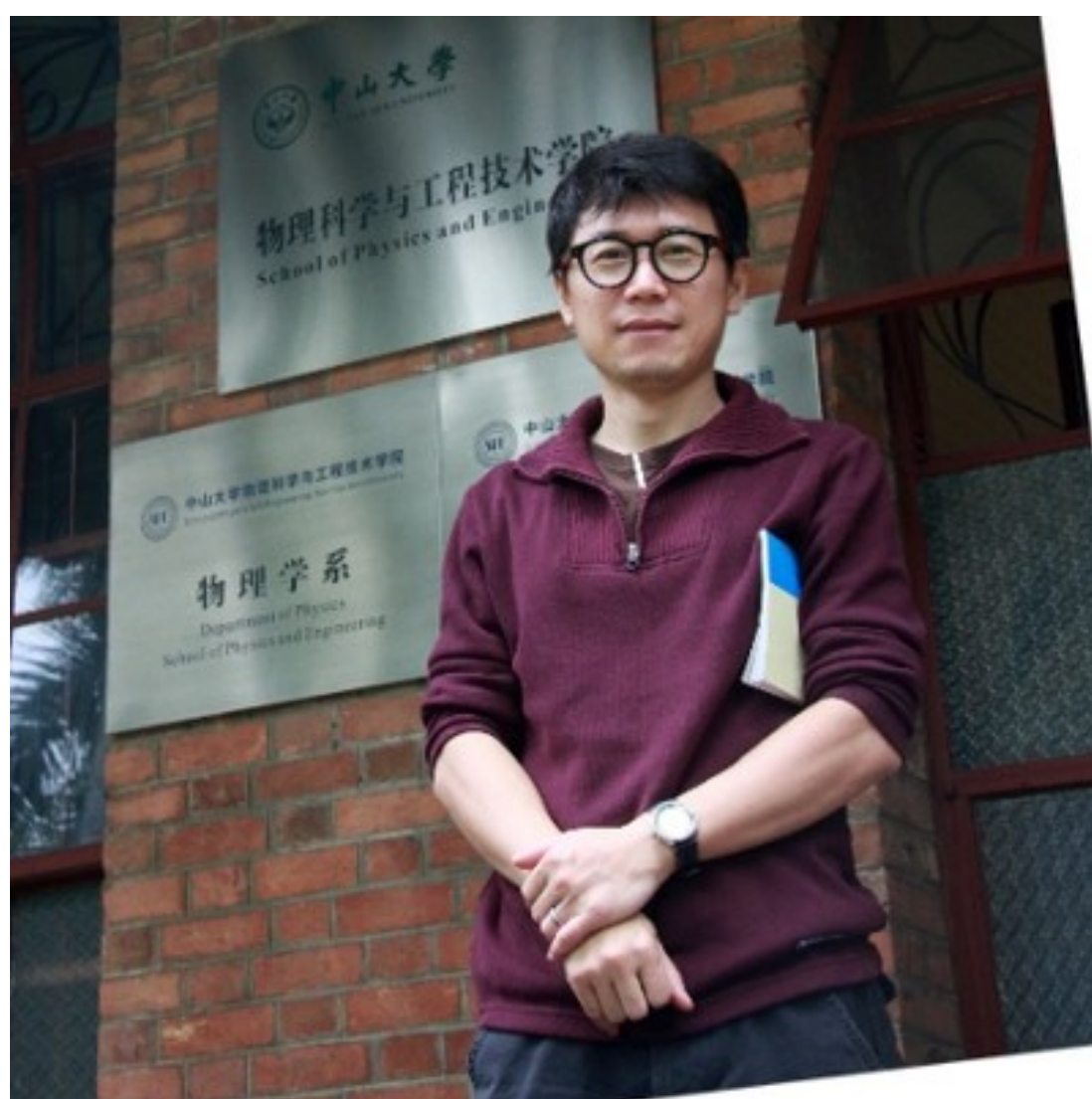
**What about  
Neutrino 2028 ?**





**Jun Cao, IHEP,**

# **Nu 2028 Beijing, China**



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





	Central Value	PDG2020	100 days	6 years	20 years
$\Delta m_{31}^2$ ( $\times 10^{-3}$ eV <sup>2</sup> )	2.5283	$\pm 0.034$ (1.3%)	$\pm 0.021$ (0.8%)	$\pm 0.0047$ (0.2%)	$\pm 0.0029$ (0.1%)
$\Delta m_{21}^2$ ( $\times 10^{-5}$ eV <sup>2</sup> )	7.53	$\pm 0.18$ (2.4%)	$\pm 0.074$ (1.0%)	$\pm 0.024$ (0.3%)	$\pm 0.017$ (0.2%)
$\sin^2 \theta_{12}$	0.307	$\pm 0.013$ (4.2%)	$\pm 0.0058$ (1.9%)	$\pm 0.0016$ (0.5%)	$\pm 0.0010$ (0.3%)
$\sin^2 \theta_{13}$	0.0218	$\pm 0.0007$ (3.2%)	$\pm 0.010$ (47.9%)	$\pm 0.0026$ (12.1%)	$\pm 0.0016$ (7.3%)

$\sin^2 2\theta_{12}$ ,  $\Delta m_{21}^2$ ,  $|\Delta m_{32}^2|$ , leading measurements in 100 days; precision <0.5% in 6 years

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

- **Nu 2030 Europe/Africa: decision at Nu2026, LOIs only here:**

- **Mariam Tortola + Sergio Pastor – Valencia, Spain**

- **Joachim Kopp + XX – Mainz, Germany**

- **Laura Baudis + Andre Rubbia - Zurich, Switzerland**

**100 years  
since Pauli !**

- **Nu 203x ???**

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

or

[neutrino\\_guy@gmail.com](mailto:neutrino_guy@gmail.com)





**You !**

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

спасибо  
danke 謝謝  
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dank je  
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mauruuru  
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mochchakkeram  
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grazie  
arigatō  
takk  
dakujem  
merci  
terima kasih  
감사합니다  
ευχαριστώ  
merci

See you all in  
Irvine. CA !

