

# **Advanced Workshop on Physics of Atmospheric Neutrinos PANE 2018**

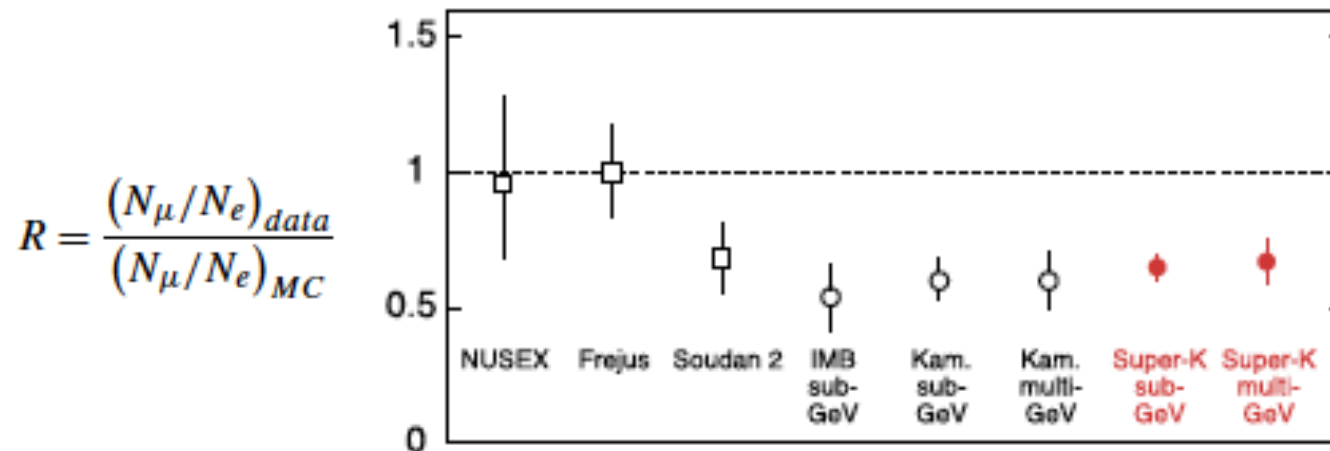
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**Dates: 28th May to 1st June 2018**

**Venue: ICTP, Trieste, Italy**

**Just before the Neutrino 2018 Conference at Heidelberg (June 4-9, 2018)**

# Atmospheric Neutrino Anomaly



T.J. Haines, et al., Calculation of atmospheric neutrino induced backgrounds in a nucleon decay search, Phys. Rev. Lett. 57 (1986) 1986–1989.

K.S. Hirata, et al., Experimental study of the atmospheric neutrino flux, Phys. Lett. B 205 (1988) 416.

**Year 1988:** First results from Kamiokande on atmospheric neutrino anomaly

Y. Fukuda, et al., Measurement of a small atmospheric muon–neutrino/electron–neutrino ratio, Phys. Lett. B 433 (1998) 9–18.

**Year 1998:** First paper from Super-Kamiokande using 414 live days (25.5 kt-years) of data addressing the anomaly



## Secretariat

✉ [smr3207@ictp.it](mailto:smr3207@ictp.it)

## Advanced Workshop on Physics Reach of Atmospheric Neutrinos - PANE 2018 | (smr 3207)

🕒 Starts 28 May 2018  
Ends 1 Jun 2018  
Central European Time

📍 ICTP  
Kastler Lecture Hall (AGH)  
Strada Costiera, 11  
I - 34151 Trieste (Italy)

### 📋 Organizer(s)

Sanjib Kumar Agarwalla (Institute of Physics), Bhupal Dev (Washington University), Antonio Palazzo (INFN Bari), Alexei Smirnov (MPIK Heidelberg), Local Organiser: Atish Dabholkar  
Cosponsor(s) the Italian Institute for Nuclear Physics (INFN)  
Secretary Nadia van Buuren

## Organizers

Sanjib Kumar Agarwalla  
(Institute of Physics), Bhupal  
Dev (Washington University),  
Antonio Palazzo (INFN Bari),  
Alexei Smirnov (MPIK  
Heidelberg), Local  
Organiser: Atish Dabholkar

## Co-sponsors



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## Year 2018

## 30 years from publication of atmospheric neutrino anomaly

## 20th anniversary of discovery of atmospheric neutrino oscillation

## Important year for ORCA, PINGU, INO

# *Various Committees*

## **Organizing Committee**

- 1) Sanjib Kumar Agarwalla**
- 2) Bhupal Dev**
- 3) Antonio Palazzo**
- 4) Alexei Smirnov**

## **Local Organizer**

- 1) Atish Dabholkar**

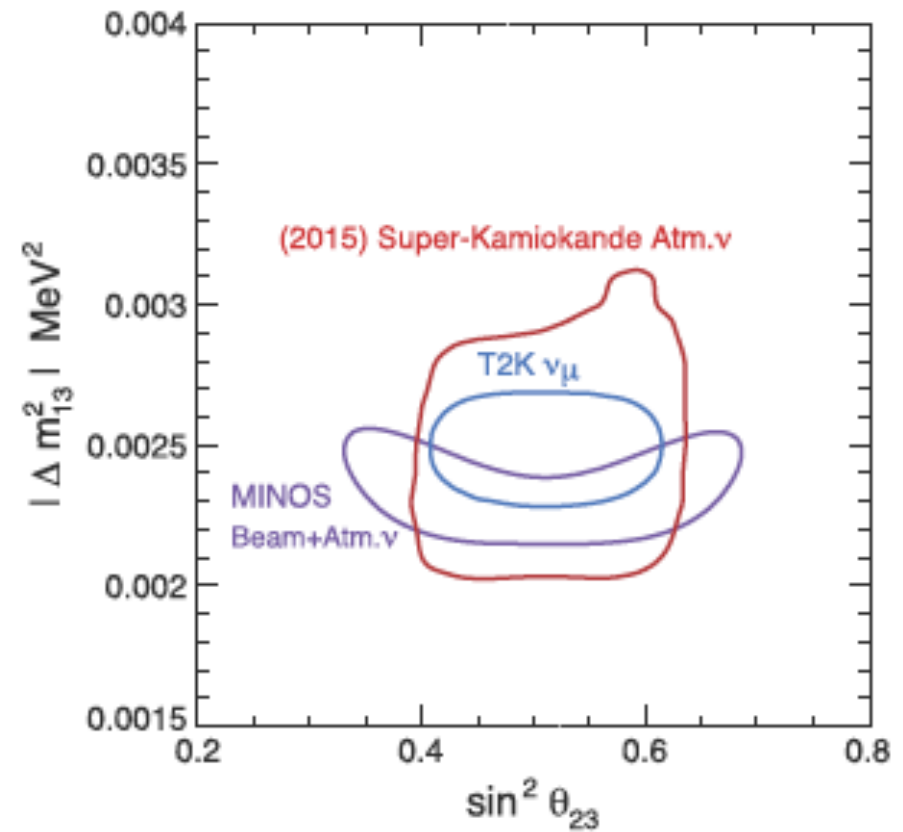
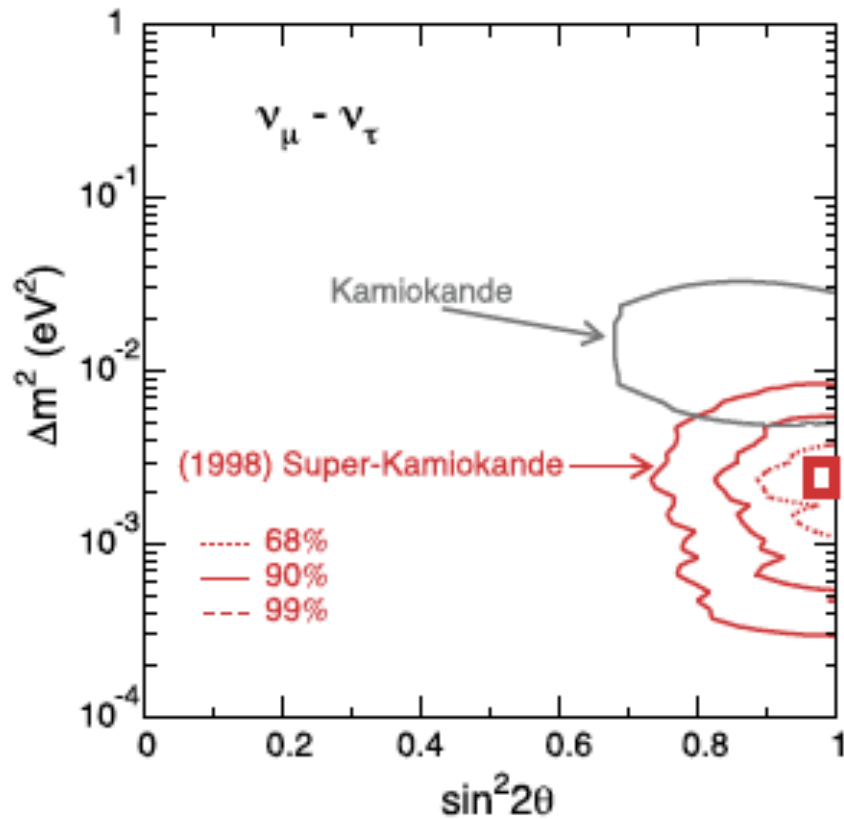
## **Secretary**

- 1) Nadia van Buuren**

## **Scientific Advisory Committee**

- 1) John Beacom**
- 2) Paschal Coyle**
- 3) Amol Dighe**
- 4) Thomas K. Gaisser**
- 5) Francis Halzen**
- 6) Takaaki Kajita**
- 7) Ed Kearns**
- 8) Eligio Lisi**
- 9) John G. Learned**
- 10) Naba Kumar Mondal**
- 11) Michele Maltoni**
- 12) Orlando Peres**
- 13) Ina Sarcevic**
- 14) Walter Winter**

# Atmospheric Neutrino Oscillation



**1998 to 2015:**  
**Impressive Journey of Atmospheric Neutrinos**  
**establishing Neutrino Oscillations**

## *List of Topics*

- Results from atmospheric neutrino experiments
- Analysis of the data & treatment of systematic uncertainties
- Cosmic ray fluxes at all energies
- Computation of atmospheric neutrino fluxes
- Neutrino-nucleon and neutrino-nucleus interactions
- Prompt atmospheric neutrinos
- Oscillations and absorption of neutrinos in the Earth
- Neutrino tomography of the Earth
- Determination of mixing angles, mass hierarchy and CP-phase
- Searches for sterile neutrinos
- Searches for non-standard neutrino interactions
- Tests of fundamental symmetries
- Future experiments with atmospheric neutrinos
- Solar atmospheric neutrinos
- Atmospheric neutrinos as a background for diffuse supernova neutrino, proton decay, dark matter searches
- Atmospheric neutrinos and cosmic neutrinos
- Synergy/Complementarity among atmospheric and LBL experiments

Now the field moves to the next phase of high-precision studies, which will enable us to effectively use atmospheric neutrinos as a tool to determine the mass ordering, octant of the 2-3 mixing angle and the Dirac CP-violating phase. In this connection, knowledge of the atmospheric neutrino fluxes at percent level is needed, which requires higher precision determination of both cosmic ray fluxes and neutrino-nucleon cross sections, as well as a better control over systematics. Understanding of atmospheric neutrinos is essential to estimate background for diffuse supernova neutrinos, proton decay, future dark matter direct/indirect detection experiments, and high-energy cosmic neutrinos.

## *Goal of PANE 2018*

The goal of the workshop is to further explore physics potential of atmospheric neutrinos and support the physics case of new experiments. We plan to bring together leading experts in both theory and experiment as well as young researchers to assess the state-of-the-art knowledge in this field and to foster further theoretical, phenomenological, and experimental studies in atmospheric neutrino physics.

**Enjoy your stay at ICTP during PANE 2018 !**