

# Report on the XI ICFA school on instrumentation in elementary particle physics



ICFA school, 12-25 Feb, 2023.

<https://www.tifr.res.in/~icfa2023/>



**12 working days : Monday-Saturday : Excursion : 19<sup>th</sup> Feb**  
**Number of registered students : 84**

**15 topics in 33 lectures during the morning session**

**29 sets of experimental (~16 independent experiment) during the afternoon sessions**

**4 Special session in the evening on the emergence topics**

**TIFR has allocated space for class room and laboratory spaces inside the institute premise**

# Organising committee

# Sponsors

## International Organizing Committee

- Ian Shipsey, Chair (University of Oxford, UK)
- Didier Contardo (CNRS, France)
- Gerardo Herrera Corral (CINVESTAV, Mexico)
- Peter Krizan (JSI, Slovenia)
- Gobinda Majumder (TIFR, India)
- Fabrice Retière (TRIUMF, Canada)
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- Local Organizing Committee
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- Kajari Mazumdar (TIFR, Mumbai)
- Indranil Mazumdar (TIFR, Mumbai)
- Rudrajyoti Palit (TIFR, Mumbai)
- Varsha Chitnis (TIFR, Mumbai)
- Prashant Shukla (BARC, Mumbai)
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- Vipin Bhatnagar (PU, Chandigarh)
- Jim Libby (IITM, Chennai)
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- Mandakini R. Patil (TIFR, Mumbai)
- P. Nagaraj (TIFR, Mumbai)
- Piyush Verma (TIFR, Mumbai)
- Mandar Saraf (TIFR, Mumbai)
- Puneet K. Patel (TIFR, Mumbai)

- Tata Institute of Fundamental Research, India
- Board of Research in Nuclear Science, India
- UK Research and Innovation (UKRI), UK
- DESY
- CERN
- KEK
- TRIUMF
- FERMILAB
- INFN & LNF

THANK YOU!

## Schedule of the school : 1<sup>st</sup> week

Date	9:30 – 10:30	10:30 – 11:30	12:00 – 13:00	14:00 – 18:00	18:00- 19:00
12/02/2023	<b>Registration</b>				
13/02/2023	<b>Landscape :</b> <i>Amol Dighe,</i> <i>TIFR</i>	<b>Interaction</b> <i>Daniel</i> <i>Froidevaux,</i> <i>CERN</i>	<b>Gaseous</b> <b>Detector :</b> <i>Maxym Titov,</i> <i>France</i>	Lab	
14/02/2023	<b>Landscape</b> <i>AD</i>	<b>Interaction :</b> <i>DF</i>	<b>Gaseous</b> <b>Detector :</b> <i>MT</i>	Lab	History of particle physics in India : Sreerup Raychaudhuri
15/02/2023	<b>Landscape</b> <i>AD</i>	<b>Interaction :</b> <i>DF</i>	<b>Trigger &amp; DAQ :</b> <i>Sridhara Dasu,</i> <i>USA</i>	Lab	
16/02/2023	<b>Statistical Meth :</b> <i>David Rousseau,</i> <i>France</i>	<b>Silicon Detector :</b> <i>Frank Hartmann,</i> <i>Germany</i>	<b>Trigger &amp; DAQ :</b> <i>SD</i>	Lab	History of collider physics in India : Atul Gurtu
17/02/2023	<b>Statistical Meth :</b> <i>DR</i>	<b>Silicon Detector :</b> <i>FH</i>	<b>Particle ID :</b> <i>Samo Korpar,</i> <i>Slovenia</i>	Lab	
18/02/2023	<b>Statistical Meth :</b> <i>DR</i>	<b>Calorimeter :</b> <i>Sunanda Banerjee,</i> <i>India</i>	<b>Particle ID :</b> <i>SK</i>	Lab	

## Schedule of the school : 2<sup>nd</sup> week

Date	9:30 – 10:30	10:30 – 11:30	12:00 – 13:00	14:00 – 18:00	18:00- 19:00
19/02/2023	<b>Excursion (Saguna Baug)</b>				
20/02/2023	<b>Calorimeter :</b> <i>SB</i>	<b>Electronics :</b> <i>Christophe De</i> <i>La Taille,</i> <i>France</i>	<b>Scintillator :</b> <i>Etinnette</i> <i>Hillemanns,</i> <i>CERN</i>	Lab	Flavour physics in India : Jim Libby, IITM
21/02/2023	<b>Scintillator :</b> <i>EAH</i>	<b>Electronics :</b> <i>CDLT</i>	<b>Accelerator :</b> <i>Isabel Bejar,</i> <i>CERN</i> <i>(ZOOM)</i>	Lab + <b>Pelletron</b> visit <i>(suggested)</i>	<b>Extra Lab on demand (which were not assigned)</b>
22/02/2023	<b>Dark matter :</b> <i>Elisabetta</i> <i>Barberio,</i> <i>Melbourne</i>	<b>Neutrino :</b> <i>Albert Gago,</i> <i>Peru</i>	<b>Accelerator :</b> <i>IB (ZOOM)</i>	Lab	<b>Extra Lab on demand (which were not assigned)</b>
23/02/2023	<b>Neutrino :</b> <i>AG</i>	<b>Quantum Sensing :</b> <i>Michael</i> <i>Doser, CERN</i>	<b>Interface :</b> <i>Cinzia Da</i> <i>Via, UK</i>	Lab	Gravit waves: A new window to the universe: <i>Bala Ayar,</i>
24/02/2023	<b>Dark matter :</b> <i>EB</i>	<b>Quantum Sensing :</b> <i>MD</i>	<b>Interface :</b> <i>CDV</i>	Lab	
25/02/2023	Students' presentation based on the lab session <b>Closing ceremony :</b> school certificates, prize for presentations (3 groups), best students' awards(4), vote of thanks (- :15:40)				

# Laboratory sessions

1. Charge (voltage) sensitive pre-amplifier (2)
2. Pulse shaping and filtering circuits (2)
3. Time-to-voltage comparator and discriminator (2)
4. Introduction to FPGA and logic code for trigger in HEP (3)
5. Characterisation of RPC detector
6. Characteristics of Plastic Scintillator detector (2)
7. Calibration and characterisation of HPGe detector (2)
8. characterisation of MicroMEGAS (1)
9. Gamma ray spectroscopy using Inorganic scintillator detector(2)
10. Basic studies with Silicon Photomultiplier (2)
11. Measurement of Muon Lifetime using scintillator detector (2)
12. Programming with Microcontroller to measure temperature and control of HV (2)
13. Cherenkov Detector (2)
14. Transient Current Technique (TCT) setup for silicon studies + AliBAVa (2)
15. Identification of natural background sources in low count rate experiment (1)
16. Gaseous Proportional Chamber (1)

By end of Jan 2023,  
write up for the  
almost all laboratory  
sessions were  
uploaded in the web  
page.

Co-ordinators : Mandar N. Saraf (E) & Ravindra R. Shinde (E)  
Total : 29 setup, 13 (24) & 3(5)



**PUBLIC LECTURE  
(Ian Shipsey)**

## **Start of the school**

Welcome on 12<sup>th</sup> Feb, 2023 (Exactly 30 years back, on 12<sup>th</sup> Feb 1993, students were welcome at the same place for the 3<sup>rd</sup> ICFA school)

**30 years to the day!**



## **Students were very interactive during the classes**

## **More interactions during the laboratory sessions**



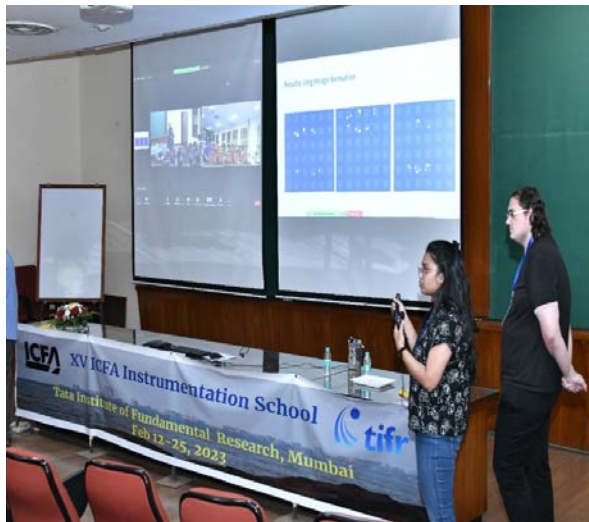
## Welcome dinner



## Tea Breaks



# Students presentations



# School Certificates

Full Participations  
during the school



The participant has been selected by the laboratory instructors and senior members during their presentations as a member of one of the best group attending the laboratory sessions





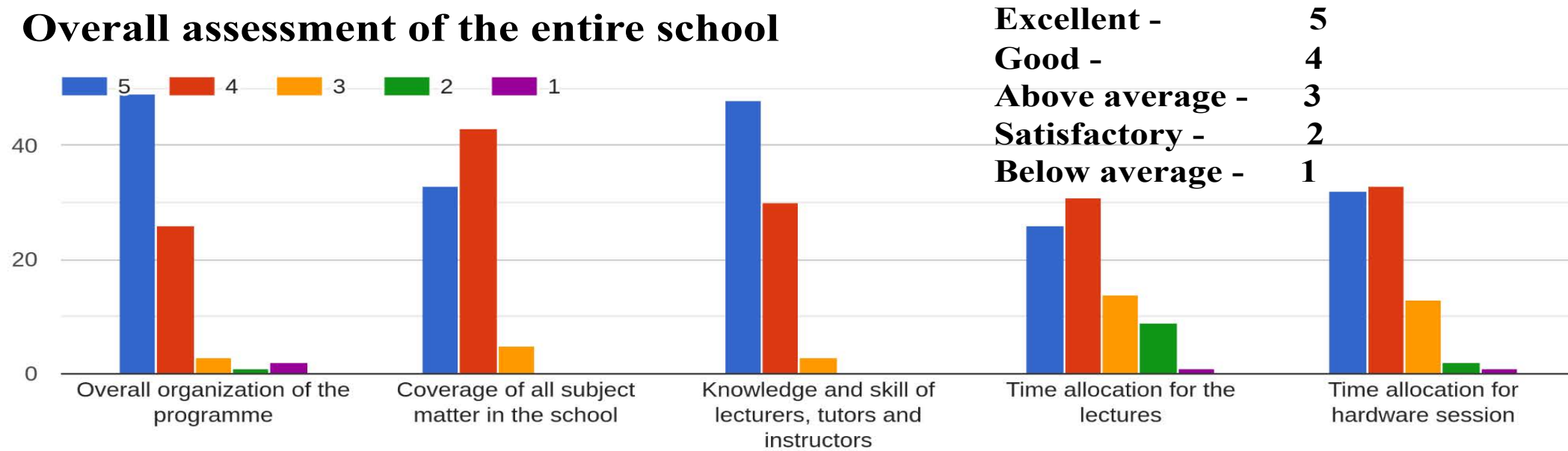
# School Certificate and prizes



**Modern Particle Physics by Mark Thomson**

# Feedback

## Overall assessment of the entire school



## Relevance of teaching methods, lectures as well as laboratory sessions

