India at Belle II

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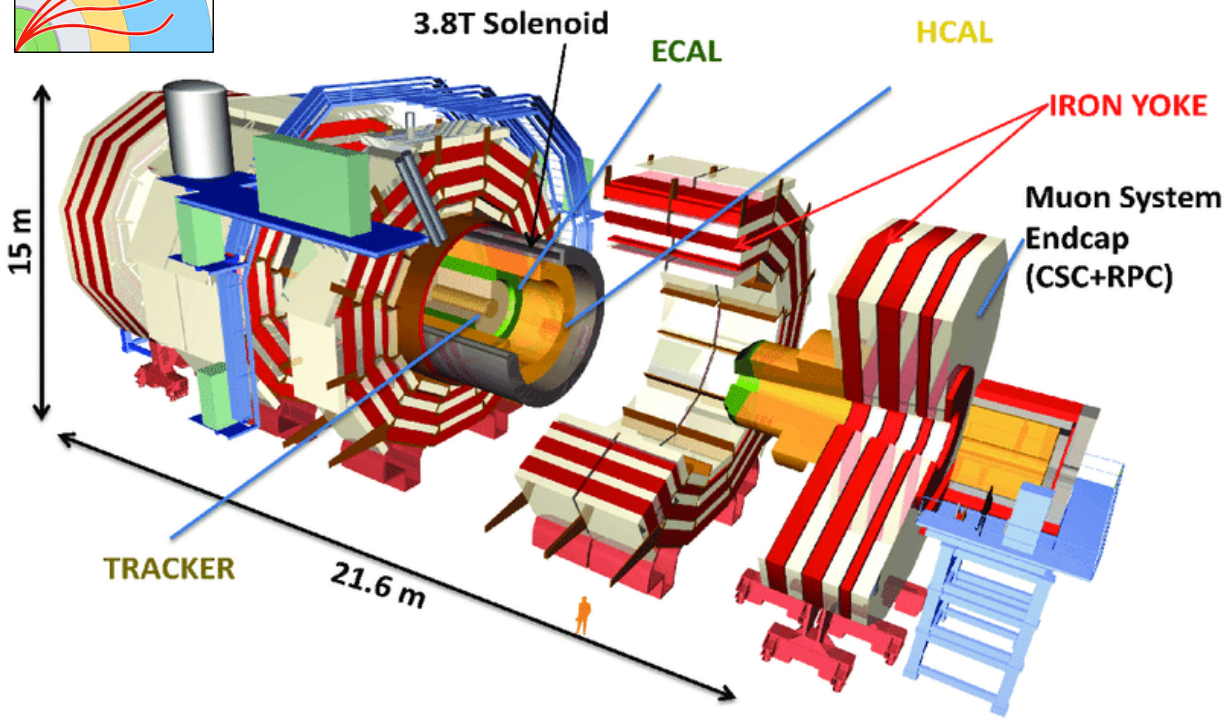
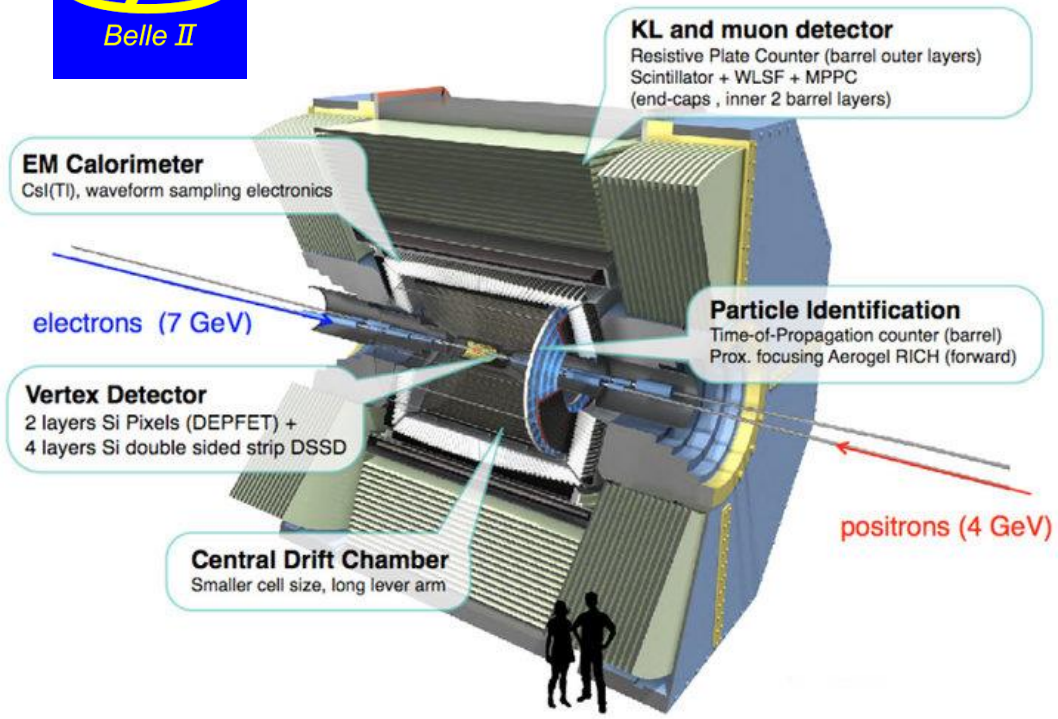
Ongoing collider-based HEP projects

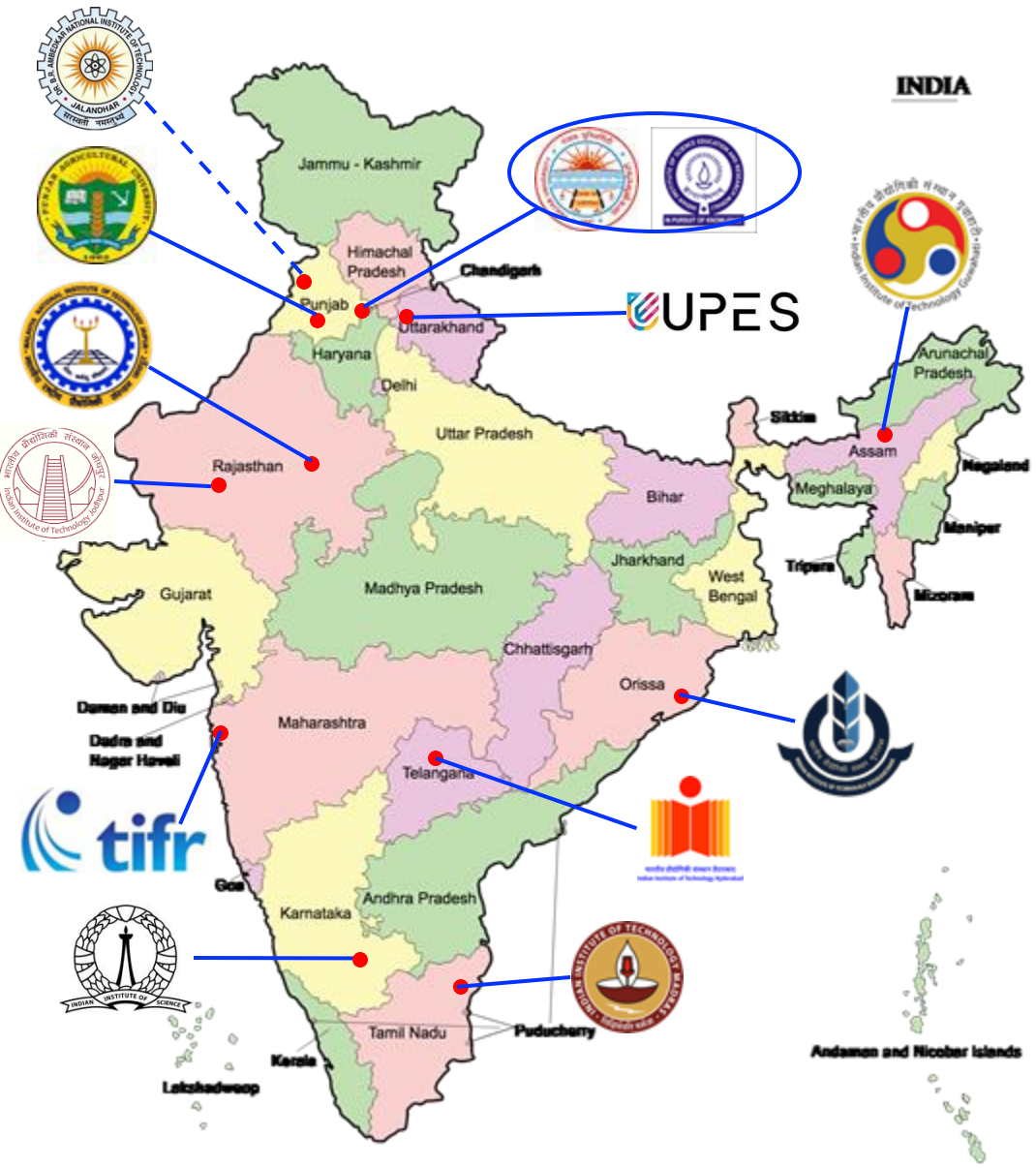


- Current: outer hadron calorimeter, silicon preshower and resistive plate chamber
- Upgrade: silicon tracker, high granularity calorimeter, gas electron multiplier, trigger
- Tier-2 grid center at TIFR
- Operation and physics analysis



- Current: silicon-strip vertex detector
- Upgrade: interest in vertex detector, PID system and muon detector
- Grid sites: TIFR (major), IITG, IITH, PAU
- Operation and physics analysis

Who all are in Belle II?



- 14 physicists from 12 Indian institutions: IIT Bhubaneswar (S. Bahinipati), Panjab Univ. (S. Bansal), IIT Madras (P.K. Behera and J. Libby), IIT Guwahati (B. Bhuyan), IIT Hyderabad (A. Giri and S. Sandilya), IIT Jodhpur (J. Kumar), IISc (M. Nayak), UPES Dehradun (V. Gaur), MNIT Jaipur (K. Lalwani), Punjab Agricultural Univ. (R. Kumar), IISER Mohali (V. Bhardwaj), and TIFR (G.B. Mohanty)
- NIT Jalandhar (S. Dutt & students) has been working as a visitor with us for a while and should now join as an independent group

☞ Size of the India-Belle II group: 60

Executive summary

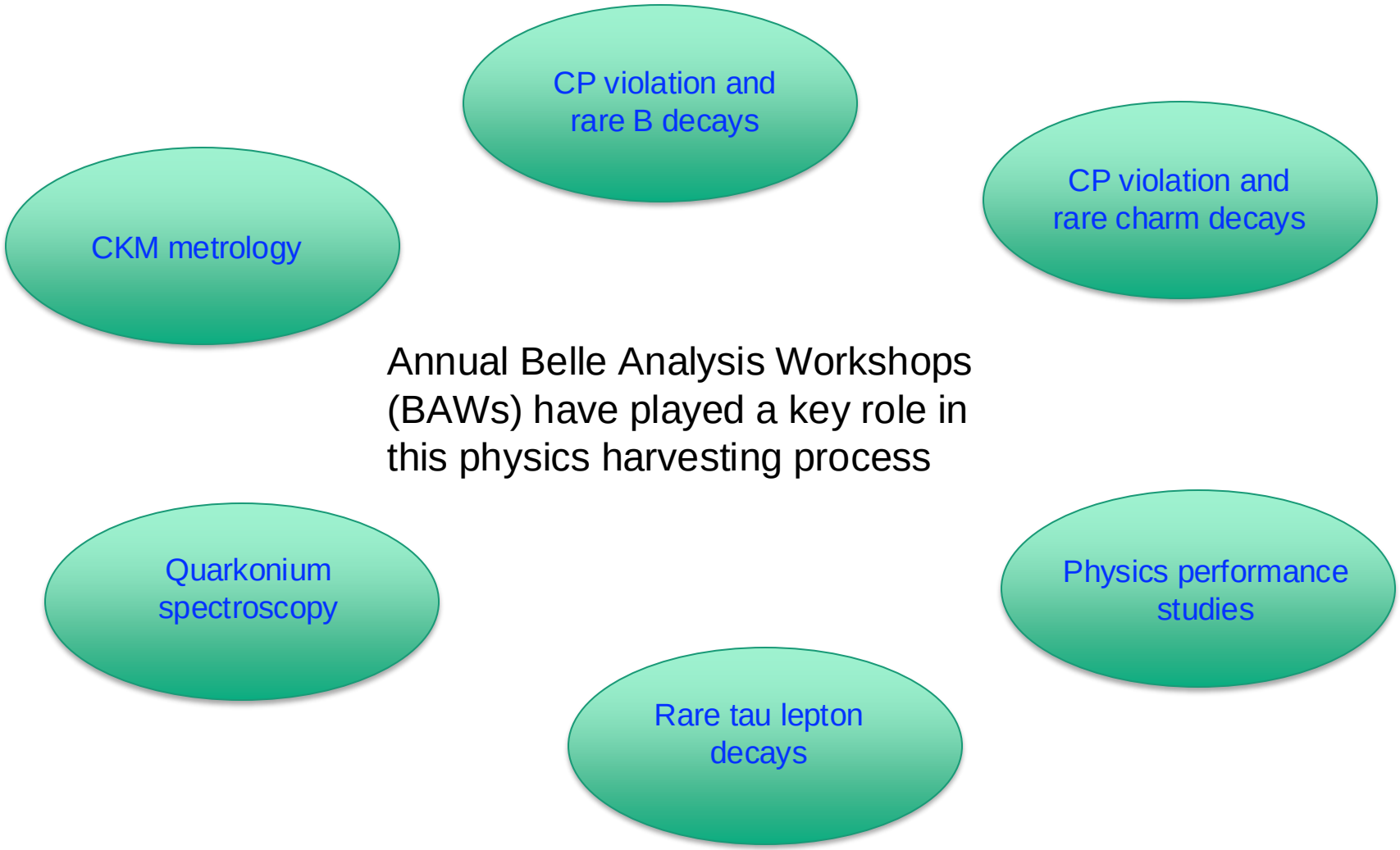
1) Human resource development:
   - Produced **27** PhD students (**21** more now working) and mentored **six** postdoctoral researchers ⇒ **five** of them are now back as faculty in India
   - Trained over **20** master, undergraduate, and project students
   - Involved **10** engineers/technicians in detector building and computing

2) Close to **50** high-impact publications with the members from Indian institutes as the lead authors; given presentations at a number of high-profile international conferences, including ICHEP and FPCP

3) Involved in the design, prototyping and construction of a key detector element, which is crucial for the science deliverable of Belle II; modest contribution to the Belle II computing

4) Leadership positions held by various members within these international collaborations ⇒ significantly larger impact compared to our overall size

Physics topics we are involved in



Plans for Belle II

1) Continue producing high-quality PhDs by training them on:
   - Thrust areas of flavor physics
   - Detector operation and maintenance, as well as possible upgrade
   - Advanced analysis techniques viz., machine learning, big data mining, and GRID computing

2) Now that the SVD is built, we plan to take care of it throughout the lifetime of Belle II, so that physics competitiveness of the latter remains unhindered
   - Taking SVD operation and monitoring shifts (remotely during Covid-19 pandemic)
   - Obtaining best sensitivity from SVD via contributions to its software development

3) Like other collaborating nations, we need to contribute to the running operation cost as well as to the total computing requirement of Belle II, proportional to the number of PhD physicists

Funding has been a challenge

- TIFR has been generously funded through the internal institutional grant
- Other groups have not been so lucky, which makes our overall participation in Belle II quite challenging

MSV2035 Document Extract

HEP recommendations: Top priority projects

- **CMS and Belle-II** are MSPs in progress with concrete plans, should be fully supported.

- Bipul and I are in the process of meeting the DAE secretary to explore if Belle II could be funded solely by DAE as an MSP

➡ Let's not loose hope and continue to work hard

Thank you so much