Curriculum Vitae

Name	Gobinda Majumder
Present Position	Senior Professor, Tata Institute of Fundamental Research, Mumbai
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Date & Place of Birth	26th Feb 1967, Jateswar, WB, India
Nationality	Indian
Sex and Marital status	Male, Married

Educational/scientific background

M.Sc. in Physics (1990-92), Gold medalist	North Bengal University, WB, India
Ph.D. (1992-1997), Bombay University, India	Search for Supersymmetric particles in e^+e^- collisions at LEP
Thesis Supervisor	Prof. S. N. Ganguli (TIFR)
Broad Subject area	Experimental High Energy Particle Physics
Collaborations	CMS, L3, CLEO, BTeV, BELLE & INO

Academic Positions held/hold

Mar 1998 - Nov 2000	Post Doc, Syracuse University, NY, USA
Dec 2000 – Jan 2001	Fellow (D), TIFR
Feb 2001 – Jul 2004	Fellow, TIFR
Jun - Sep 2022	Foreign Visiting Scientist, KEK, Japan
Jun - Sep 2023	Foreign Visiting Scientist, KEK, Japan
Aug 2004 – Jul 2009	Read (F), TIFR
Aug 2009 – Dec 2014	Associate Professor, TIFR
Jan 2015 – Dec 2021	Professor, TIFR
Jan 2022 -	Senior Professor, TIFR

During last three decades of Gobinda Majumder's academic career, he has been associated with many different experiments within India and abroad, e.g., (i) L3 experiment at CERN, Geneva, (ii) CLEO experiment at Cornell Univ, Ithaca, USA, (iii) proposed BTeV experiment at FNAL, Batavia, USA, (iv) BELLE experiment at KEK, Japan, (v) CMS experiment at CERN, Geneva and (vi) India-based Neutrino Observatory (INO) at TIFR. In each of those experiments, he has made significant contributions, which were used by the entire collaboration and high energy physics community all over the world. At present, his primary focus is the detector development for the future collider experiments, particularly calorimeters using quantum sensors.

L3 : Before the LEP operation at $\sqrt{s} > 2M_W$, he provided techniques for the feasibility study of W mass measurement at LEP2 in the $e^+e^- \rightarrow W^+W^- \rightarrow \ell\nu jj$ & 4-jet channels using simulated events as well as combining two Z-events of LEP1 data. His work on the search of supersymmetric leptonic partners has an initial impact in SUSY parameter space.

CLEO : Along with Prof. Skwarnicki he has developed the entire RICH software code and interfaced it with CELO-III C++ infrastructure. He had developed software tools to analyse test beam data and align RICH detectors with respect to the central tracking system, which was used during the whole CLEO-III and CLEO-c run period and was the main source of many physics publications in the heavy quark sectors.

BTeV : He was involved in the optimization of the length and radius of PbWO4 crystal for ECAL. He has shown that instead of using rectangular arrays of crystal, projective type geometry can give much better position resolution of gammas as well as better π^0/γ separation and subsequently BTeV collaboration moved to projective geometry of the proposed BTeV detector. Eventually, he analysed the simulated events to explore the possibility of being able to detect the rare decay modes B hadrons and CP violation study in those channels (e.g. $B\rightarrow\rho\pi$, $B\rightarrow\pi^+\pi^-$, $B\rightarrow K^+\pi^-$, $B\rightarrow K^+K^-$ and $B\rightarrow\psi\eta/\eta'$), which significantly improved the quality of BTeV proposal.

Belle : He was the first to realise that the conventional neutrino reconstruction technique for measuring the CKM matrix element V_{ub} is not suitable for the asymmetric beam energies of Belle/Babar and developed alternate techniques for it. He has measured rare decay modes of B-meson to pair of charm mesons (e.g., D^+D^-, D^0D^-, D^+D^{*-}), which were difficult and complicated channels that had high level of interest world-wide because of its relevance of CP violation. He was the first to dig out signals of X(3872) decays to $D^0\,\bar{D}^0\pi^0$ in $B\rightarrow D^0\,\bar{D}^0\pi^0K$ channel, which helps to pin down the quantum state of X(3872) to $J^{PC} = 1^{++}$ and ruled out many theoretical models.

CMS : During his Ph.D. period, he has played major roles to select and design the CMS electromagnetic calorimeter, which was essential in the discovery of Higgs boson in $\gamma\gamma$ channel and led the design and construction of the CMS outer hadron calorimeter (HO). He has proposed and developed the algorithm to calibrate this subdetector and also conceptualized a new algorithm to integrate its signal in the global CMS reconstruction framework. His concept was also propagated to other CMS sub-detectors as well as upgraded CMS detector design.
He was the first to point out that the measurement of muon charge misidentification from $Z \rightarrow \mu^+\mu^-$ events is conceptually incorrect, which was propagated from the concept of $Z \rightarrow e^+e^-$ events **for more than three decades**. But, the more challenging one was to identify the source of MET-ϕ modulation during 2013. While all CMS members were convinced that the source

is misalignment of HCAL subdetectors and the whole run-I data were to re-reconstruct with that ad-hoc alignment correction. He has shown that it was due to mainly noise, dead regions of different sub-detectors etc., and eventually in June 2013 CMS data were re-reconstructed according to his suggestions, otherwise all results of CMS experiments would have been biased.

From the asymmetry of W^+/W^- production rate as a function of rapidity at the CMS experiment he was able to choose the best *pdf* models and also improve its prediction to reduce the uncertainty of the production rate of many physics processes at LHC energy. Using hadronic event shape variables he has selected and improved the best models for QCD hadronization process and multiparton interactions. He also did the first measurement of a jet's cross-section as a function of jet radius (R) and showed that most of the QCD models are not tuned properly to predict the rate at very low or high value of R.

INO : He single handedly developed the entire offline software for the INO detector to carry out simulation as well as reconstruction. This package is used by members of the INO collaboration and he has also trained INO members for further improvement of it. He has developed the algorithm to monitor the performance of the RPCs in the prototype stacks, alignment of the position of RPC in the stack and corrections for the time measurement in all individual electronic channels in situ, which helped him for many physics publications from the prototype RPC stacks, which were mainly commissioned for the characterization of RPC detectors and relevant electronics. All these techniques were developed to use in the INO-ICAL experiment.

In general, large scale experimental results show the time resolution of RPC detectors is 1.5 to 3.0ns, but he developed an offline calibration technique to improve the resolution to 0.6-0.7ns. This significantly improves the INO physics potential by reducing the up-down ambiguity of muon direction. All these were crucial in projecting the true potential of the INO-ICAL detector to the global neutrino community. At the end he was given the complete responsibility of the INO project. Unfortunately, this project did not see the light after the tunnel, though he spent almost his full academic career for this national project.

Training of students : In the last two decades, Gobinda Majumder has directly or indirectly guided 14 students and is now guiding 3 students for their Ph.D. degree. In the INO lab (both in Mumbai and Madurai), he has regularly brought students from all over India to give them hand-on experience in experimental particle physics. He has been giving lectures in different schools and organized many, the last important one was the "XV ICFA School on Instrumentation in Elementary Particle Physics" at TIFR, during 12-25th Feb, 2023.

Due to his significant contributions to the scientific community, he was elected fellow of all three science academies of India and part of the many national/international organization, an important one was the Fermilab (US) Long Baseline Neutrino Committee (LBNC);