



Interest of Indian Groups to N-Nbar Oscillation Experiment at Fermilab

June, 2012

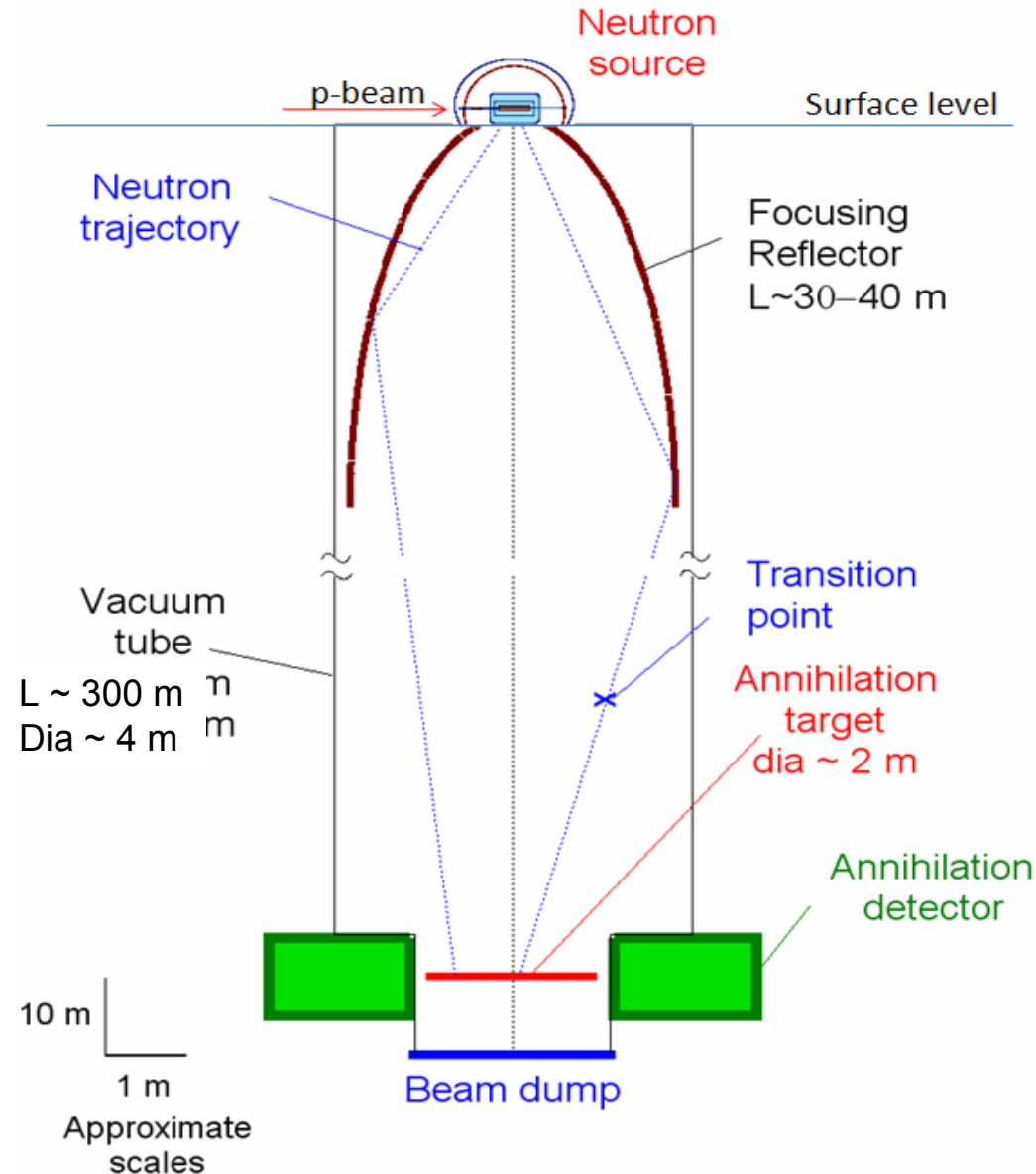
Sunanda Banerjee

Groups in India



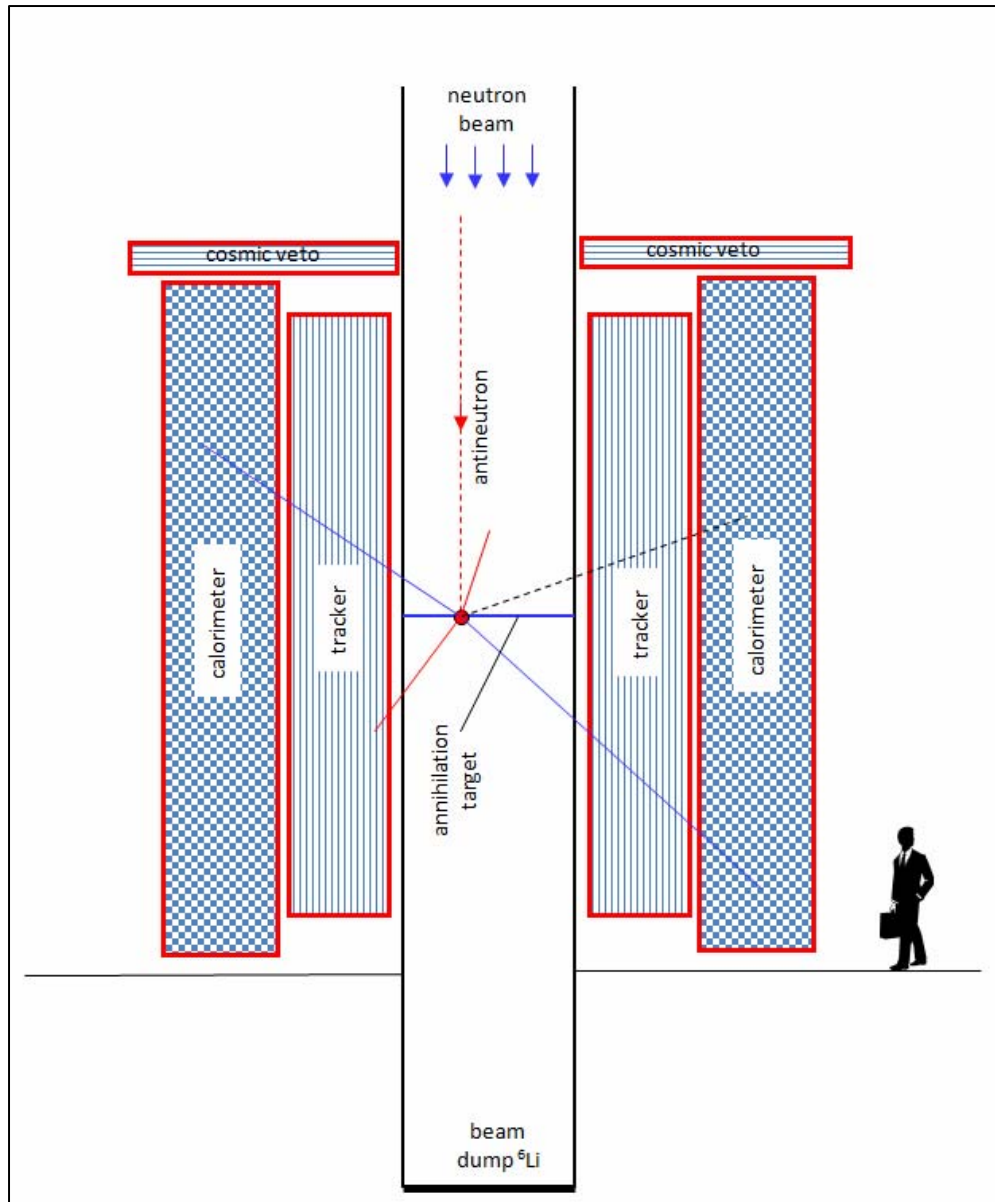
- ❑ During May, 2011, a short workshop was organized by Dr. Amlan Ray in VECC, Kolkata on N-Nbar oscillation studies
- ❑ Several experts from USA participated in this event
- ❑ A group from VECC (Kolkata) led by Dr. Ray had a few discussions with the Nuclear and Particle physics groups at SINP (Kolkata)
- ❑ The 2 institutes jointly show interest in joining an activity on N-Nbar oscillation studies
 - P. Das, A. Ray, A.K. Sikdar at VECC
 - S. Banerjee, S. Bhattacharya, S. Chattopadhyay at SINP

Possible Participation



- ❑ As mentioned by Y. Kamishkov, W. M. Snow, a possible setup will use a very long tube to hold ultra-cold neutrons
- ❑ Neutrons (anti-neutrons) may stay in this tube for ~ seconds
- ❑ Necessary to have the tube to be shielded from geo-magnetic field to the extent of ~nano Tesla
- ❑ Active and passive shielding is necessary over a large volume
- ❑ At BARC (Mumbai) shielding to the level of nTesla is achieved in a small volume

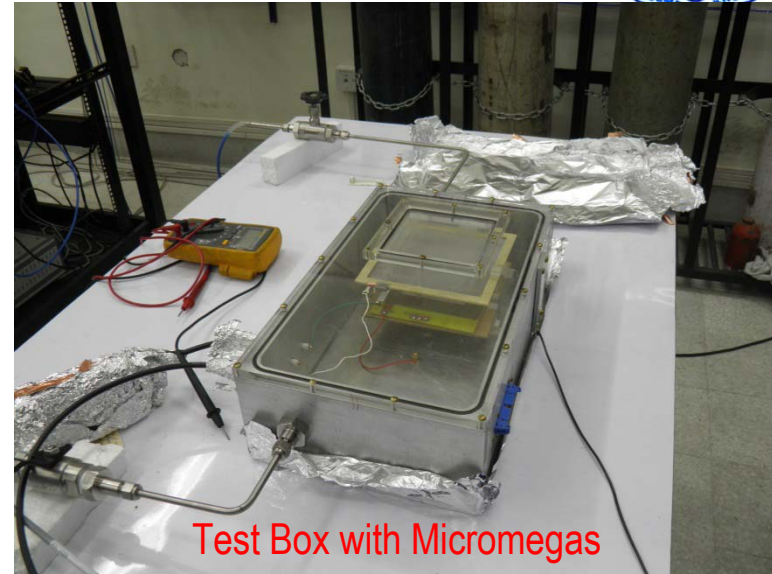
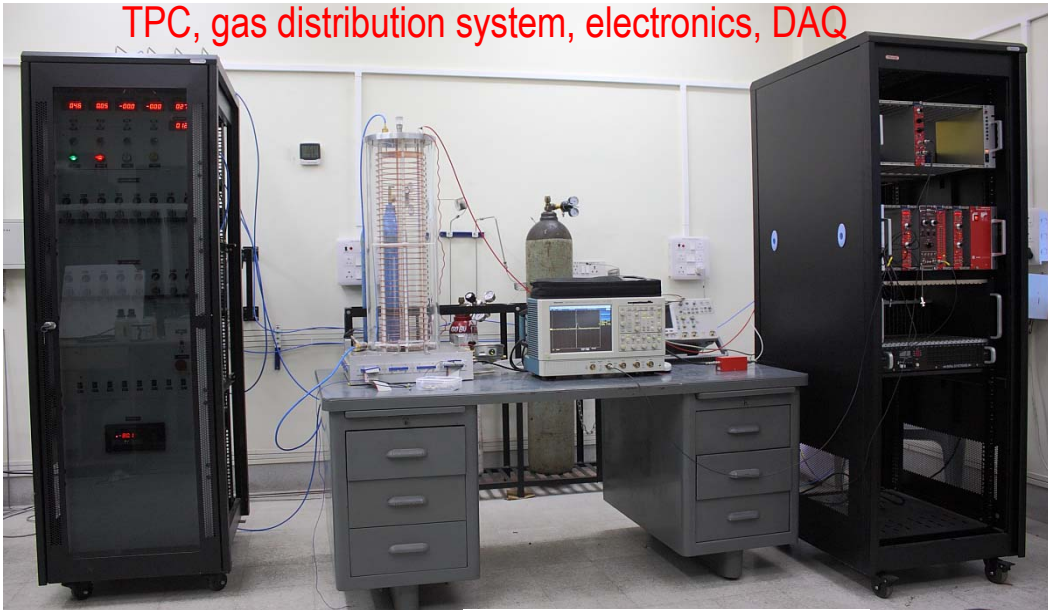
Possible Participation



- ❑ Detection of anti-neutron through annihilation requires a large volume of tracking device
- ❑ Groups in SINP and VECC have some experience in building wire chambers
- ❑ Made the second arm of the ALICE muon spectrometer at CERN
- ❑ Participating in the RD51 collaboration for generic detector development
- ❑ Thinking of making some prototype TPC to evaluate if this could be a possible device for the tracking detector

Micro-Pattern Gas Detector Laboratory

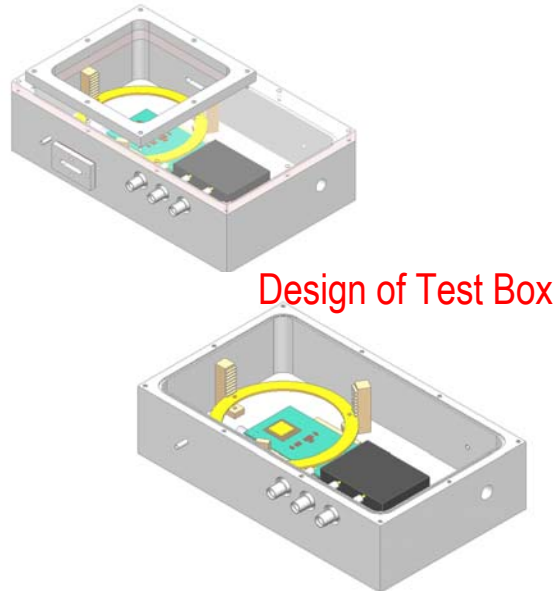
TPC, gas distribution system, electronics, DAQ



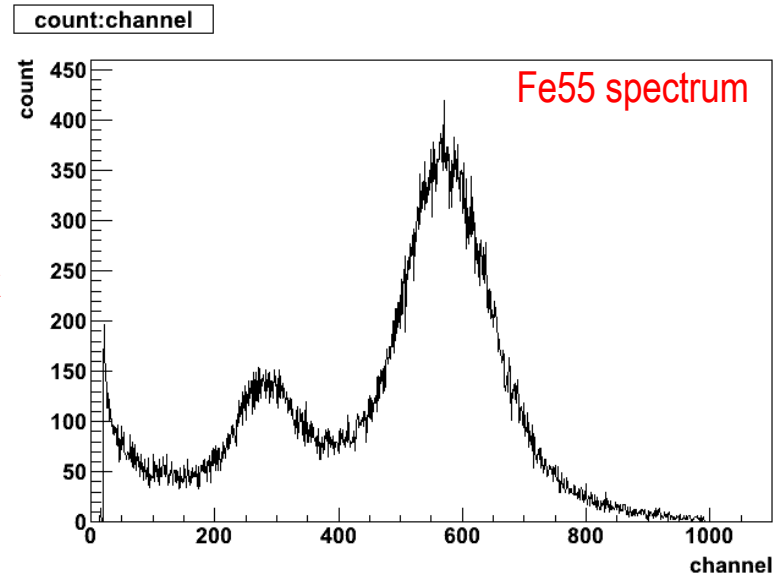
Test Box with Micromegas



BULK Micromegas



Design of Test Box



Current Plan



- ❑ Involve in the design and construction of a **Micromegas based small TPC device** with an aim to act as a **three-dimensional tracking device** which will be useful to identify and track particles of interest.
- ❑ A long cylindrical chamber is planned to be constructed to mimic a small TPC where the Micromegas will serve as one endplate.
- ❑ The active volume of the TPC will act as a conversion region of the Micromegas. A gas mixing unit will be used to circulate a specific gas mixture in the device.
- ❑ The uniform drift field in the conversion zone generated by applying appropriate potential difference between the far electrode on one side of the chamber and the micromesh (cathode) of the Micromegas at the other will be maintained with the field rings placed inside the chamber.
- ❑ The anode of the Micromegas will provide two-dimensional spatial readout of an event occurring in the TPC volume while the TPC will offer the spatial third dimension from the measurement of the drift time through the conversion region