Indian plans at ISOLDE and HIE-ISOLDE

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ISOLDE, CERN
SINP, BARC, VECC, Bose Institute, IUAC(Delhi), IUAC(Kolkata), PRL,DU, PU, BESU, CU etc.
Indian plans at ISOLDE and HIE-ISOLDE

- Infrastructure development, Experiments

Accelerating structures (BARC++, DISCUSSION !!!!!)

SRF cavity R&D with the possibility of having a high-beta cavity substrate being manufactured at BARC and sputtered at CERN

Target Technology (SINP ++, BARC++, CAT (Indore) !!)

Radiochemical nuclides of interest in Pb-Bi irradiated targets

Decay scheme studies using radiochemical methods

Bk isotopes, 194Thg

Detector systems: Future photon spectrometer
Experiments:  
Nuclear Physics, Atomic Physics, Condensed matter, Chemical science, Bio physics

Detector systems: Future photon spectrometer → LaBr3 array + Charge particle (?) + ……

Secured funds (2012-2017, XIIth plan DAE) (Discussion started in June, 2011)
SINP++, BARC, DU, PU + others welcome to join Experiment or facility!!
Bivash Behera (Punjab University)
Dissipation, neutron multiplicities
S.Roy: Reaction mechanism around Coulomb barrier
B.K.Nayak: Surrogate reactions
Suggestion: Lanthanum Bromide with n-array setup at ISOLDE for studies such as 233Th(d,p)234Th and other reactions relevant to the r-process
BARC. P.U., Delhi, SINP, TIFR and others

Ajit Sinha (IUC) Barrier distribution for $^{30,32}$Mg on $^{40}$Ca using quasi elastic scattering
Arun Jain (BARC) Knockout reactions
Core knockout of a halo nucleus (making it hollow!)
Samit Mandal (Delhi University) Multi-nucleon transfer reactions
Sarmistha Bhattacharya: Spectroscopy using VAMOS SPIRAL, GANIL
S.Saha: Exploring nuclear structure of neutron deficient heavy nuclei at ISOLDE
Aradhana Shrivastava Fusion and transfer $^{6,8}$He SPIRAL, GANIL
Nuclear structure theory: V.K.B.Kota, Sukhendu Sarkar

Summary talk by A.Chatterjee, BARC
N.Madhavan (IUAC, New Delhi)
HIRA and HYRA spectrometers at IUAC
$^7$Be RIB beams from HIRA
HIMALAY - Heavy Ion Mass Analyzer coupled to Large gAmma arraY (!)
Samit Mandal (Delhi Univ) Multinucleon Transfer

Tilak Ghosh (SIMP)
Width of Fission Mass Distribution
Fission Angular Distribution
Quasi fission

Rahul Tripathi (Radiochemistry Divn., BARC)
Fission studies
Decay scheme studies using radiochemical methods
Bk isotopes, 194Th$^g$
Proposed decay scheme studies at ISOLDE
New scintillator array at ISOLDE, CERN

Present photon spectrometer →

MINIBALL
• 24 HPGe
• 6-fold segmented
• $\varepsilon \approx 3\%$ @ 1.3 MeV
$\forall \varepsilon \approx 1\%$ @ $E_g > 3$ MeV

Future photon spectrometer
➢ Original contribution
at ISOLDE-CERN
Developed laboratory at SINP
Development of MMRPC at SINP, Kolkata for R3B neutron TOF detector

- Double stack glass MMRPC.
- 1st prototype active dimension $20 \times 40 \text{cm}^2$
- Anode: PCB with strip 2cm wide.
- Gas mixture used: R134a(88%), SF6(5%), Isobutene (7%).
Response of developed MMRPC for cosmic muons and $\gamma$-rays

- Coincidence measurement of MMRPC with LaBr$_3$:Ce detector at SINP, laboratory.

- Extensive testing
  - cosmic muons, $\gamma$-rays ($^{60}$Co, etc.)
  - MMRPC time resolution, $\sigma_t < 150$ ps.
Response of different LaBr₃(Ce) detectors for $^{60}$Co

Medium crystal size LaBr₃ detectors:
Dimension: 3.5 cm (dia) and 3.5 cm (length)

Time resolution $\sigma_t \sim 140$ ps

Energy spectra of two medium LaBr₃ in coincidence

Big crystal size LaBr₃ detectors:
Dimension: 7.6 cm (dia) and 15 cm (length)

Time resolution $\sigma_t \sim 225$ ps

TAC spectra between two medium LaBr₃ detectors

TAC spectra for Big and small LaBr₃ detectors
LaBr₃ array at HIE-ISOLDE

LaBr₃ scintillator array

- $\epsilon \approx 40\% @ 1.3$ MeV, $dE \sim 3\%$, >>>>>>
- $\epsilon \approx 20\% @ E_\gamma \sim 10-20$ MeV, $dE \sim 1\%$, $\sigma_t \sim 225$ ps>>>>>>

Will be one of the most advanced, most efficient gamma-ray spectrometer in the world