HIAT09 OUTLOOK

Amit Roy

No. of participants = 129

Topic	Invited talk	oral	Poster
Electrostatic	1	5	1
Linacs	2	12	9
Circular	2	7	9
RI Facilities	4	9	5
Therapy	2	0	0
Applications	1	2	8
Ion sources	2	7	3
General	1	2	5

Electrostatic Accelerators

David Weisser

Category	Past few years	Next few years	Wish list
Power supplies & Vac Equipment	Yal, MPI, ANS, TIF, BNL, ANU, ORN, FSU, MLL	Yal, ANS	Yal, MPI, ANS
Accel Tubes HVEC VIVIRAD	FSU, IRM, Mic		LNS, LNL
Accel Tubes NEC	JAE, MPI		ORN
Voltage grading	LNL, MPI, TIF, San	USP, IUA	MPI, TIF, IUA
Computer control upg	ANS, MLL, MPI, ANS, TIF	FSU, ANU, IRM, Pur	BNL
Beam pulsing	IUA	TIF, FSU, USP, ANU, Yal	
Positive ion source	ANL, LNL, BNL	ANL, LNL, BNL	
ECR Terminal	JAE	JAE, IRM,	Yal, Mel, HFI
High vlotage deck	HMI, CIA, ANS, MPI	HMI, CIA	
LINAC expand	CIA	CIA	FSU, San, JAE
Replace/Add El Accel		ANS	Mel, Mic, NOS, IRM
Pellet chains	San, Yal		Wei, IUA
RIB accelerator	LNS, ORN, CIA	LNS, ORN, CIA	Yal, JAE
RIB recoil	FSU, Pur	FSU, Pur, ANU	Yal

Electrostatic Accelerators have not lost their relevance.

Many machines are being refurbished for specific applications, other than Nuclear Physics.

In niche areas they are still the best.

Astro-Nuclear Physics, High density Physics.
AMS

LINACS

Quite vigorous R & D activities spurred by new demands.

A renaissance in superconducting heavy ion Linacs. --- R. Laxdal

ANL, LNL, ISAC-I & II
ANU, FSU, KSU, JAEA
TIFR, IUAC
SARAF
MSU
HIE-ISOLDE
.....

Techniques for improving performance.
Clean Cavity processing techniques yielding excellent results.
No essential difference between low beta and high beta cavity performance.

Circular Accelerators

Cyclotrons, Synchrotrons

All existing machines have active R & D programmes.

These are the accelerators of choice for high energies.

Major upgrades:

RIKEN, GSI-FAIR, JINR, HIRFL-CSR

Ion Sources

ECR & EBIT sources are the sources of choice.
Drive towards charge breeder.

Good tutorial on the physics of these sources -- R. Becker

Yet, there is scope for innovations in other designs for specific applications.

Radioactive Ion Facilities

Jerry Nolen

Currently running:
ISOLDE, MSU, ISAC-I, SPIRAL-1, SIS, RARF, ORNL

In the pipeline
ISAC-II, FRIB, RIBF, SPIRAL-2, FAIR
Several lower power projects:
SPES; EXCYT; CARIBU; HIE-ISOLDE; Texas A&M RIB upgrade; Gas-filled and vacuum separators at RIKEN, the LBNL 88" cyclotron, Jyväskylä, GSI, HRIBF, and ATLAS; storage rings for radioactive fragments ESR at GSI and CSR at HIRFL/Lanzhou

No single facility can fulfil all these needs.
A wide variety of techniques and technologies are required.

HEAVY ION DRIVERS

Synchrotrons such as the GSI FAIR facility

CW cyclotrons such as RIKEN

CW superconducting linacs such as FRIB

FFAG: new ideas being developed, applicability and cost factors currently unknown

Heavy ion fusion

Spontaneous fission plus gas catcher (CARIBU, ^{252}Cf)

CHALLENGES Jerry Nolen

High power target

High power beam dumps

Radiation heating of SC magnets

Radiation damage of coils and other components

Beam purity at low energies due to charge state mixing

Transverse and longitudinal acceptance at low beam energies

Range bunching for stopping in the gas cell, especially for light ions.

Therapy. AMS, Applications.....

Hadron therapy has come of age.

Protons still the dominant species of ions.

C and other heavy ions show good results but jury is still out on whether they would replace protons.

Large number of labs developed Accelerator Mass Spectrometry. Many dedicated facilities.
Low energy electrostatic machines making it almost a table top facility.

Laser driven Accelerators. Are they the future?

OUTLOOK

HIAT has unique character among all Accelerator related conferences, being all encompassing.

Relative weights between topics reflects the interest and involvement of the community.

Many new techniques and developments were discussed.

Many interesting & challenging new projects.

Augers well for the Accelerator community and the HIAT conference.

Thank you all.