Upgrade ideas for REX low energy part Nov 2004

Highest priority

1. Slow extraction from the EBIS Less pile-up at the REX experiments

Requires

Two weeks of reprogramming of control system

2. New reliable cathode Operational for one year without interruption

Requires

10-15 kCHF and a few months testing From Kimball Physics

3. New gun/collector design

To be able to run heavy elements Pb/U Also higher space charge capacity -> more ions Also larger acceptance -> more efficient Also faster breeding for light elements

Goal reach 500 mA and later reach 400 A/cm2

Requires

Simulate a new gun/collector design Post doc work at MSL Stockholm 1-2 years or Oliver's doc student Post anode gun

4. TOF after the REX mass separator To measure total charge for sub-pA beams

Requires

1 kCHF for equipment and 2 days technical assistance

Medium priority

1. Mass separator vacuum improvement for 2006 if 1 year shut down Less recombination -> can transport heavy elements Pb/U Less contamination inside the EBIS -> cleaner beam

> Requires Major effort in terms of vacuum manpower and cost

2. New cathode material to avoid 11Boron contamination For Li and Be runs Requires

IrCe type gun from Russia 10 kCHF for special power supply 2 month tests at MSL Stockholm

3. Build up cathode test bench (pieces available) To test cathode life-time and temperature

> Requires 10 kCHF and 2 man months

4. New REXTRAP ion source Plasma source with mass markers RF spectrometer

> Requires 10 kCHF drawing and workshop assistance 1 man month assembling and testing

5. DAQ for the Si detector after the REXTRAP and the PM tube after the mass separator

Verify that radioactive beams go though REXTRAP and REXEBIS when dealing with low intensity beams

Requires 10 kCHF 1 man month assembling and testing

Low priority

1. Align BTS between trap-EBIS – for 2006 if one year shutdown Gives better injection efficiency

Requires

1 month alignment support

2. Coat EBIS collector with NEG coating Gives better vacuum inside the EBIS => less residual gas peaks

> Requires New collector from MSL Stockholm 1 kCHF Installation and tests 1month

3. Exhaust from the REXTRAP roughing pumps to recovery balloons

Requires

Vacuum group effort

4. Build beam transport from mass sep to ISOLTRAP Improved ISOLTRAP accuracy

Requires

Major effort in terms of vacuum manpower and cost

5. He refrigerator for the REXEBIS Avoid he weekly LHe filling for the EBIS

Requires

30 kCHF and 2 weeks installation and tests

6. NOAS for signal surveillance Allows for surveying and controlling all signals at REX

Requires

Major investment and manpower

Beam tests

- 1. Rotating wall experiments for very high currents Method investigation Emittance measurements EBIS injection
- 2. Continuous injection into the EBIS (with Becker's Coulomb target?)
- 3. Improved trap efficiency Injection simulations Insertion/moving of orifices Insertion of an adjustable exit diaphragm
- 4. Light masses, injection and cooling, breeding.
 - * Li cooling, breeding Goal: Refining the injection into the EBIS for light masses. Check-up of the timings

* He cooling, breeding Goal: same than before + overcoming the charge exchange problem inside the trap. Testing other cooling method or H2 cooling??

4. Heavy masses, breeding tests.

Pb cooling, breeding Goal: refining the breeding for heavy masses/defavorable A/Q. Tests of long breeding times together with long trapping cycle.

5. Noble gases, trapping tests.

He,Ne,Kr,Ar,Xe trapping Goal: cooling tests with He as a buffer gas. Ions lifetime measurement. He cooling again. Check up of the impurities inside the trap.

- 6. Mass resolving power tests inside the REXTRAP. Some isobar rich beam, "cocktail" beam Goal: mass resolving power tests at the trap
- 7. Verify injection efficiencies for 30 and 60 keV