Beam Strategy Meeting

Monday, February 25, 2013, 15:00-16:10

Attending:
F. Ames, P. Bricault, G. Hackman, R. Kruecken (chair), P. Kunz, J. Lassen, L. Merminga, C. Morton, Ch. Ruiz

Excused:
J. Behr, J. Dilling

Minutes:

1. **Stable beam developments**
   The DRAGON group has prepared a list of stable beams required for their project. The table is appended to these minutes.

   The different were discussed:
   - ^{7}Li:
     - 1000:1 purity requirement has to be clarified - Chris Ruiz reported after meeting that it refers to mass-7 purity. Other masses can be distinguished and suppressed
     - required intensities should be possible as Li^{3+} beam from super-nanogan, some tests need to be carried out, main contaminant N^{2+}
   - ^{88}Sr beam needs development but is not highest priority
   - ^{34}S is possible from enriched material, extensive cleaning of source needed afterwards
   - Ne, Na beams are established and are not a problem
   - ^{35}Cl beam has been used 2 years ago

   Colin will communicate development needs to Keerthi

2. **Developments needed for ^{7}Be beam (DRAGON)**
   Two options for ^{7}Be beam production are identified.
   - buy as Be-oxide and insert into ISAC target container. Not clear if this is available.

- Produce ^{7}Be online and extract. Yields need to be measured. Consensus is that this can be done at the yield station, taking precautions regarding the long lifetime.

^{7}Be yields will be measured from SiC target (#1) and from Ta target (#2) using laser ionization.

3. Target schedule for 2013

Discussed SiC-FEBIAD/CTL target. There is uncertainty on the extraction of CO gas from the target with the CTL. The main purpose of the target is the development of ^{18}Ne beam for tests with TUDA in ISAC-I. ^{14}O intensity (as CO) is expected to be sufficient for GPS and TITAN needs. The 8pi experiment running in parallel to the GPS may only have marginal intensities unless extraction from this target is similar to the last test with SiC-FEBIAD target in 2012. The expected ^{15}O intensities are not sufficient, even in the best-case scenario, for 10^{6} pps to ISAC-II. Therefore S900 cannot be scheduled.

4. Overall development goals in 2013

The overall development goals are reviewed and discussed.
Clear commitments exist to

- Completion and testing of the LIS-RFQ
- Completion of the conditioning station
- Completion and operation of FEBIAD/CTL
- Refurbishment of TM3 for operation in Schedule 125

These developments require substantial resources and priorities have to be set for additional development projects.
There are two further opportunities for developments:

- Development of a neutron converter in cooperation w/ ISOLDE
- Design, construction and implementation of a new rotating beam mechanism (design review this week)

Since the development of a rotating beam holds the promise of substantially increased extraction efficiencies this development is seen as high priority and thus will be pursued this year for implementation in the 2014 shutdown. The neutron converter development will be carried out in 2014.

Instead of the originally envisioned UC target with neutron converter, target #6 will instead be a metallic U/Ta target for the possible development of neutron-rich Ca beams, which are not released well from UC targets due to the formation of carbides. There is some risk involved in the operation of this target since the operating temperatures have to be limited to avoid melting of the U on the target disks.

The table below summarizes the planning for the target sequence in 2013.

#	Date	Tgt	Ion-source	TM	Example beams	Examples of possible experiments	Development
1	4/18-5/7	SiC	SIS/LIS-RFQ	TM4	^{20,23}Mg, ^{25}Al,	RFQ commissioning, TITIAN (standby)	RFQ-LIS R&D
2	5/8 – 6/2	Ta	SIS/LIS	TM1	^{8}Li, ^{10,11}Be	bNMR, TIGRESS	No accelerated beams heavier than A=11 , ^{7}Be yields
3	6/5 – 7/4	Ta	SIS/LIS	TM4	^{9,11}Li, ^{8}Li, ^{21,25}Na	TIGRESS, IRIS, HERACLES, bNMR	Test Be yields, $^{30-33}$Na
4	7/10 – 8/6	UC	SIS/LIS	TM1	Rb, Sr, Fr	8pi, TIGRESS, FrPNC, laser	^{239}Pu, $^{30-33}$Na
5	8/7 – 9/4	SiC	FEBIAD-CTL	TM4	^{18}Ne, ^{14}O, ^{15}O (?)	TUDA-I, 8pi/GPS, TIGRESS (?)	^{18}Ne yields
Mini Shutdown							
6		U/Ta	SIS/LIS	TM3	^{5x}Ca, ^{5x}Sc	8pi, TITAN (standby)	Ca, Sc yields
7		Ta	SIS/LIS	TM4	^{11}Be, ^{9,11}Li	TIGRESS, IRIS, TUDA, bNMR	To be decided if we run low or high power
8		NiO	FEBIAD	TM3	^{10}C	8pi/GPS, IRIS, TITAN	Delivery of light C beam
9		UC	SIS/LIS-RFQ	TM4	^{221}At, Ac, Cd	8pi, TITAN	First production with LIS-RFQ source: At,Ac,Cd

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Reiner Kruecken

Beam	Intensity (pps)	Minimum intensity (pps)	Purity ratio minimum (beam:contaminant)	Experiment number	Description	Status	Priority	Desired run dates	Comments
^{7}Li	1e+9	1e+7	1000:1	S1025	7Be+p at DRAGON	Approved	H	Aug-Sept 2013	^{7}Li required for backgrounds and commissioning
^{48}Ti	Goal: >1e+7	test	test	S1289LOI	44Ti(p,g)/(a,p) at DRAGON and TUDA	Endorsed	1 (a,p) 2 (p,g)	Shutdown/ startup 2013	Efficiency tests of TiF_4 in Supernanogan oven. Accelerator not needed. 1-2 weeks required.*
^{44}Ti	Goal: >1e+7	5e+6	1000:1					2014	Measurement (OLIS RIB approval needed)
^{51}V	1e+8	1e+6	100:1					2014	Charge State Distributions for ^{44}Ti(p,g)
^{80}Kr	1e+11	1e+10	1000:1	TEST	DRAGON high mass tests	N/A	N/A	April 2013	Enriched ^{80}Kr is available for purchase
^{88}Sr	1e+8	1e+6	100:1					April 2013	Charge State Distributions
^{20}Ne	1.2e+12	1e+12	1000:1	S1363	20Ne(p,g)21Na and 21Ne(p,g)22Na at DRAGON	Approved	M	Oct-Dec 2013	Measurement
^{21}Ne	5e+8	1e+8	1000:1					Oct-Dec 2013	Measurement
^{23}Na	5e+9	1e+9	100:1					Oct-Dec 2013	Charge State Distributions
^{34}S	5e+9	1e+9	1000:1	S1372	34S(p,g)/(a,g) at DRAGON	Approved	M	May-Jul 2013	Measurement
^{35}Cl	1e+8	1e+6	100:1					May-Jul 2013	Charge state distributions for ^{34}S(p,g)
^{38}Ar	1e+8	1e+6	100:1					May-Jul 2013	Charge state distributions ^{34}S(a,g)

* Plan to test efficiency by placing a known quantity of TiF_4 into an OLIS oven, establishing a beam, and running until the material is depleted or we reach the end of the time alotted. TiF_4 is soluble in water and so the quantity will be controlled by making an appropriately dilute solution, placing a controlled amount of the solution in the oven and letting the water evaporate away before use.