Minutes of Beam Development Strategy Meeting, December 13th 2016, 3pm MOB Board Room

Present: Chris Ruiz (rec), Jens Dilling, Oliver Kester, Jens Lassen, Friedhelm Ames, John Behr, Marco Marchetto, Peter Kunz, Iris Dillmann
Apologies: Barry Davids, Alex Gottberg, Bob Laxdal

1. **Business Arising Since Last Meeting**

   a. **New Yields for Summer schedule 2016**

- Based on PK's list of new & improved beams from 2016 based on analyzed yield measurements, CR did a cross-check with the development spreadsheet to see if anything would change. There are a few instances where there is overlap. Those are Thulium, Manganese, Francium and Actinium isotopes. For Tm & Mn, CR will consult with PK to see what contaminants are to see if improved yields can now give estimate of deliverable beam and contaminant ratio, to be compared with experimental requirements. Beams can either be moved to GREEN or considered developed depending on what we find.

- Francium can be considered DEVELOPED for S1324.

- For now, CR will directly inform proponents if a beam is developed or moves in difficulty on the database. In future, Users should be informed to check database frequently at Call for Proposals time.

   b. **Corrections to Master Sheet**

- Gordon Ball pointed out that S1632 was not on Master Spreadsheet. Notes from Last EEC Beam Readiness Review:

S1632 LOI Beta decay of 71-80Cu isotopes: nuclear structure of nuclei around 78Ni

- GRIFFIN experiment at ISAC I (A. Illana, B. Olaizola)
- Request:73Cu 1*106 , 74Cu 1*106 ,75Cu 1*105, 76Cu 1*104 , 77Cu 1*1063, 78Cu 1*102, 79Cu 1*101, 80Cu 1/s at GRIFFIN, cocktail at GRIFFIN (total beam as intensity) okay
- Delivered: 73Cu 3*101, and 74Cu 1.7*105 beams have previously been produced at ISAC from Nb/LIS and UO/FEBIAD.
- Comments: requested yields not demonstrated yet
- Experiment is evaluated as not feasible now, will require development, but okay for LOI.

EEC Result: Endorsed Priority 2

Action Item: CR to consult with FA, PK on where this should go in development sheet

- CR added Cooled Transfer Line to Master Sheet and in STATS graphs. FA pointed out that we need a separate HP CTL and LP CTL. The HP CTL should be considered almost ready to go online - needs some more offline testing. The LP CTL needs to be developed and extensively tested offline.

Action Item: CR to add HP CTL and LP CTL as separate items on master Sheet

2. **Report on Beam Development Activities in schedule 131**

- PK (and FA, JL) reported on yields and development activities on schedule 131. Overall 1300 individual yield measurements made.

- SiC + IG-LIS: Although there were some issues with the IG-LIS, 7Be yields and Li yields were able to be measured. Data still need to be analyzed. 7Be/7Li ratio will be available which is important step towards H priority 7Be experiments. The issues (lower than standard Be yields, for example) were caused partially by low laser power reaching the source due to coating of laser window - particularly sensitive to the wavelength used for Be. Also, PK thinks target is too cool for significant Be release. New high-T pure graphite target suggested. New laser window will be installed in April.

- SiC + FEBIAD: Preliminary results show nothing exceptional about this FEBIAD. However, systematic studies were performed over a large grid of operating parameters. It is now understood how to optimize the FEBIAD and operate it stably. Also noticed that the emittance is high for the FEBIAD, so improvements in that area will boost yields. It was also learned that the FEBIAD is not extremely sensitive to coil current. Thus the prospect of a FEBIAD without a coil will also allow more versatility as it will be compatible with both ITE and ITW. FEBIAD will also be simulated in coming year, which will help identify possible areas of improvement.

- Ta + LIS + Rotating Beam: Rotating beam studies were used to confirm higher Li yields. Various parameters were investigated including rotation radius, beam spot size. This is now considered commissioned. Gained experience delivering rotating beam yield to running experiment stably. Be yields from this target were not exceptional, again, caused by problems with laser window. In addition, Li yields appear to drop with time. Could be Ta containers cracking? Or some chemical equilibrium condition etc. Advisable to schedule Li high intensity beams at beginning

of target life, and e.g. b-NMR later.

3. Items from "medium term list" for schedule 132

- RF Booster: This will be installed during shutdown, though the timeline is tight. Will need to be commissioned. This can be done with beam from OLIS. R. Laxdal advised 1 week of accelerator downtime (low-E RIB can be run) circa June for the purpose of commissioning if it doesn't get done in early schedule.

- SiC with nanofibres: This would not be ready until Fall 2017. However there are other developments that will be considered for 2017. Firstly, a graphite insert for UC targets is an important development This will cut the time required to manufacture UC in half, freeing up time for other target fabrication. Plan to make 2 ready for online operation. This is evaluated as low risk. In addition, a new high-T operation shortened target is planned that will enhance short-lived isotope yields (e.g. 14Be). This should be added to Master Sheet as development item (along with UC+graphite). This could be put online as soon as Fall, but if there is opportunity for schedule 132 should also be considered. This is rated as priority #1 for new targets by beam development team. Comes with prospect of many H priority experiments ion the books that would be potentially helped.

Action Item: CR to add "High-T Target" and "UC+Graphite" to development spreadsheet

- J. Lassen also wants to use Ta+IG-LIS to look at lanthanides, specifically Yttrium yields. Will request at Call for requests time.

4. Other schedule 132 or long term possibilities

- Thorium of interest. Could be run in 2018. Needs to be discussed further at this meeting.

- CSB gaseous inlet. Could be used for high mass beams. Xenon good example. This means can run when other experiments also using OLIS, when proton beam not available. Long lived beams e.g. 14C need to be considered. There was resistance from GRIFFIN users. However CR pointed out that activity would be low. (CR notes that a beam of 1e9 /s run for 1 week would compose of a total activity (if all dumped in one place) equivalent to the amount of 14C activity in the average human body). For 44Ti, oven is required. Committee needs to discuss recent OLIS tests with TiF4 before considering action towards this.

- Cooled Transfer LIne (CTL) needs to be confirmed for stable operation offline, but then will be ready on timescale of 1 year (???) for online operation.

5. AOB

- Discussion of recent scheduling issues regarding implantation. Suggestion that beam requests have to have all beam properties filled in as mandatory, so that beam delivery can evaluate correctly what equipment/personnel is needed to schedule.

Meeting ends at 4:45pm