Plan for S327 test run 1 (Apr. 17/18, 2009)

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1.) FRS Ion Optics

New optics: FRS Target Station 2 ➜ Cave C
Load theoretical data set from optics calculations:

From SIS to TA:	**sista2007_ta2**	(11.6308 Tm)
From TA to Cave C:	**FRSTOR3B-TA2-2008**	(11.6308 Tm)

Matrices for MOCADI: `/u/boutin/gico/mocadi/matrix/R3BFOC***.MAT`
Matrix printout and envelope plot also on /d/frs01/sue/S327/mocadi/matrix/

2a.) Tuning of ^{12}C pilot beam through FRS

Switch FRS magnet power supplies from "FRS" to "Caves" before closing caves. Switch on ALADIN power supply, set to remote control.

At FRS:

Tune ^{12}C beam **(735.0 MeV/u)** with about 1kHz via FRS to Cave C.
At console/SD-program ("Sonderoptionen"): Load theory dataset ".._sista2007_ta2" and scale with MGSKAL (at FRS, Cave C or ESR console only!) **from SIS to TA** by 0.7926 = 9.219/11.6308. Center at TA with MIRKO ("Geradelegen").

Insert SC21 (3.3 mm thick, set TS3ESA_S=250 mm) and SC81 (3 mm thick, set TH4DI5_S=234 mm)

Load theory data set …$_FRSTOR3B-TA2-2008.SET at SD console and scale TA-CC with the following scaling factors:
TA-S2 by 9.218/11.6308=0.7926
S2-S8 by 9.191/11.6308=0.7902
S8-CC by 9.167/11.6308=0.7882

^{12}C pilot beam, no target, no degrader, SC21 3mm, SC813mm			
Section	Energy (MeV/u)	Bρ (T m)	beta
SIS-TA	735.0	9.219	
TA-S2	734.9	9.218	
S2-S8	730.6	9.191	0.8282
S8-CC	728.6	9.167	0.8277

Check centering of the beam in the FRS up to S8 with MWPCs. Record Hall-probe B-values, calculate effective radii of dipoles D1-D7. Record magnet settings with SRMAG at FRS console.
Old values of dipole radii and bending angles (from S277/S295, p.41):

Dipole	radius (m)	angle (rad)
D1	11.2511	0.5231
D2	11.2774	0.5221
D3	11.2779	0.5198
D5	12.0844	0.1223
D7	11.4612	0.5228

SC81 position calibration: Insert MW81/82 and record/plot GO4-spectrum of MW-pos at SC81 vs. Δt(SC81L-SC81R).

Predicted transmission of ^{12}C: S2-S8=97.5%; S8-CC=94.8%; S2-CC=71.4%.

Check for achromaticity at S8 by scaling TA-S8 by ± 0.5% and observe S8 focal position in GO4.

At LAND:
Adjust ROLU-voltages and -CFD-thresholds. Check centering of the beam at Cave C with ROLU. Switch on ALADIN field to center ^{12}C on NTF (I ≈ 1600 units). (Empty target at Cave C).

Check all detectors, adjust delays, check q-windows and t-start/stops, CFD thresholds, multiplicities.
- SC21, SC81, POS, PSP1/2 q- and t-spectra; PSP1/2 position spectra.
- GFI1/2 and NTF q- and t-spectra.
- Check μSSD spectra.

No pixel runs for PSP since 12C yields bad position resolution.

2b) Calibration of degrader thickness
Add wedge degrader at S2, thickness 737.1 mg/cm^2 Al. Rescale all FRS section separately.
Degrader settings: disks only, wedge angle = -4.44mg/cm^3 or 1.645 mrad.

Wedge	TS3ED7VU(O)	+100 mm
Disk:	TS3ED7DP	in
Disk angle	TS3ED7DS	84.7 degrees
Ladder	TS3ED7LS	out (-108.4 mm)

^{12}C pilot beam, no target, S2-disks, SC21 (3.3 mm), SC81 (3 mm)			
Section	Energy (MeV/u)	Bρ (T m)	beta
SIS-TA	735.0	9.219	
TA-S2	734.9	9.218	
S2-S8	726.5	9.150	0.8273
S8-CC	724.4	9.134	0.8268

Predicted transmissions: TA-S2=97.3%; S2-S8=95.2%, S8-CC=70.7%, S2-CC=67.3%.

2c) Calibration of production target
Insert Be-8047 production target (pos.38). Rescale all FRS section separately.

^{12}C pilot beam, Be-8047 target, S2 disks, SC21 (3.3 mm), SC81 (3 mm)			
Section	Energy (MeV/u)	Bρ (T m)	beta
SIS-TA	735.0		
TA-S2	687.9	8.837	
S2-S8	679.3	8.767	0.8158
S8-CC	677.2	8.749	0.8152

Predicted transmissions: TA-S2=63.1%; S2-S8=96.7%, S8-CC=68.2%, S2-CC=65.9%.

3) ^{8}B secondary beam setting

SIS energy of ^{12}C beam = 735.0 MeV/u, Be-8047 production target (pos.38), degrader wedge in. Rescale all FRS section separately.

Degrader settings: disks only, wedge angle = -4.61mg/cm^3 or 1.71 mrad.

Wedge	TS3ED7VU(O)	+100 mm
Disk:	TS3ED7DP	in
Disk angle	TS3ED7DS	84.5 degrees
Ladder	TS3ED7LS	out (-108.4 mm)

Fragment ^{8}B, Be-8047 target, S2 disks, SC21 (3.3 mm), SC81 (3 mm)			
Section	Energy (MeV/u)	Bρ (T m)	beta
SIS-TA	735.0		
TA-S2	682.3	7.054	
S2-S8	670.4	6.977	0.8135
S8-CC	668.3	6.963	0.8130

Predicted transmissions for ^{8}B: at S2 $1.7 \cdot 10^{-4}$/beam particle; S8=$9.5 \cdot 10^{-5}$, CC=$4.2 \cdot 10^{-5}$

Check isotope id at Cave C. Make sure that ^{8}B is centered at S8 and on LAND target. Check rate (prediction is $\approx$ 40,000 ^{8}B per spill for 10^9 ^{12}C ions at TA). Only small contaminants should be ^{7}Be (300 per spill) and ^{10}C (500 per spill).

Remove LAND target. Check Z-spectrum in NTF.
Sweep ^{8}B over GFI and NTF.

Insert Pb-200 target. Center Z=4 (Be) on NTF.

Production run:
Set trigger cocktail and record trigger downscale factors in file sheets.
Search for proton hits in DCH1/2 and TFW in coincidence with Z=5 (B) in front of LAND target and with Z=4 (Be) in NTF. Position spectra should be symmetric on p detectors.

The total cross section for Coulomb breakup of ^{8}B is about 300 mb. With a 200 mg/cm^2 ^{208}Pb target, this yields about 1.8E-04 breakup events per ^{8}B projectile or 7 breakup events per spill.