

TITAN Meeting Minutes

July 29th, 2009

Present: Max, Stephan, Thomas, Mel, Matt, Jens, Dave, Scott, Alain

K Beam Time Preparations

- Stephan presented the list of preparations need for the beam time (attached)
- Dave suggested that we could use highly charged ions for the whole beam time. It would be the first time an isotopic chain had been measured to high precision. Alain said if we can highly charge stable K, then there would be no problem for the rest.
- Matt: Safety concern with decay of K-38 to gs? (2.2MeV gamma ray. Shielding issues?)

Ar-38

- Thomas: could we design a tube or needle that goes close to the trap centre? (this would take a few weeks to set-up/test)
- Alain: maybe design some gas recycling system
- Could get a cheaper/smaller bottle to test
- Matt: can get Xe gas from the liquid Xe detector guys for charge breeding tests
- Jens gave permission for Stephan to buy a bottle once more quotes come in.

Baking

- Max: leaving the baking to the last week may not be a good idea
- Matt: use a heat gun to do the baking (like β NMR)

RFQ

- Alain: RFQ only has an efficiency of ~0.1-0.2%. Could spend some time optimizing
- Dave: If we can measure a current coming in then we've already hit the space charge limit

EBIT Magnet

- Matt: Field strength must remain stable from ~Aug 20th for a week.

Preparations for K- Beamtime:

Tests and setup for K from off line ion source

Do we need spare parts?

Switch to K- source (Please take pictures!)

Optimization of EBIT injection with ^{39}K
4 T \leftrightarrow 5 T

Investigation of TOF resolution after EBIT extraction:
can we resolve K^{+9} from $\text{C}^{3+}/\text{O}^{4+}$ and N^{3+} ?
if not x) use $^{38}\text{K}^{4+}$ instead or
x) dipole cleaning (possibly EBIT and MPET) of $\text{C}^{3+}/\text{O}^{4+}$ and N^{3+}

Investigation of dipole cleaning with HCI (EBIT)
separate $\text{C}^{3+}/\text{O}^{4+}$ and N^{3+}

Optimization of charge breeding with ^{39}K charge state $q = 9 / q = 4$

Optimization of transfer and injection of $^{39}\text{K}^{+q}$ into MPET

Investigation of dipole cleaning with HCI (MPET)
separate $\text{C}^{3+}/\text{O}^{4+}$
is it feasible to clean isomer from ground state?
effect of dipole cleaning on species of interest

Quantify charge exchange probability of $^{39}\text{K}^{+q}$ in MPET as a function of T

Determination of losses when storing ion bunches of $^{39}\text{K}^{+1}$ for 1-5 s in EBIT (trapping potential should be low enough such that recoil kicks ^{38}Ar out of the trap)

Implementation of cycle to be used for ^{38}K - g.s (The $^{38\text{m}}\text{K}$ cycle is identical except for the storage of ions in the EBIT)

Injection of K into EBIT
Store ions in EBIT for 3-5 s
Charge breed K to $q=9 / q = 4$
(*Dipole cleaning EBIT*)
Transfer HCI to MPET
(*Dipole cleaning MPET*)

Confirm settings for $^{39}\text{K}^{+1}$: to be used for neutron rich K; form RFQ directly into MPET

MPET Vacuum

- Restrictor after switchyard.
- Possibly remove PIPS if a leak is found there
- Test if moderate 'baking' (=increase outgas rate) of MPET vacuum chamber at ??? degree Celsius works: 'baking' with installed system or heat gun
- Bake MPET vacuum chamber at ??? for ??? days

Timeline for Preparations:

Week Jul 26 – Aug 1, 2009

Switch to K- source (Max, Mel, Aaron)

Week Aug 2 – 8 2009

Restrictor after switchyard (Mel)
Possibly remove PIPS if a leak is found there (Mel)
Optimization of EBIT injection with ^{39}K (Alain, Aaron)
Spare parts? (Max, Alain, Thomas)

Week Aug 9 – 15 2009

Investigation of TOF resolution after EBIT extraction (Alain, Max)
Determination of losses when storing ion bunches of $^{39}\text{K}^{+1}$ for 1-5 s in EBIT (Thomas)
Test of moderate 'baking' of MPET vacuum chamber (Scott, Max)

Week Aug 16 – 22 2009 (Stephan is back at TRIUMF Aug 17, Paul F. arrives Aug 21)

Investigation of dipole cleaning with HCl in EBIT (Alain, Aaron)
Optimization of charge breeding with ^{39}K charge state $q = 9 / q = 4$ (Alain, Max, Stephan)
DO NOT CHANGE MAGNETIC FIELD starting Aug 20 (b-NMR)

Week Aug 23 – 29 2009

Optimization of transfer and injection of $^{39}\text{K}^{+q}$ into MPET (Alain, Max, Stephan)
Investigation of dipole cleaning with HCl in MPET (Paul F., Stephan)

Week Aug 30 – Sep 5, 2009

Quantify charge exchange probability of $^{39}\text{K}^{+q}$ in MPET as a function of T (Paul F., Stephan)
Confirm settings for $^{39}\text{K}^{+1}$

Week Sep 6 – 12 2009

Implementation of cycle to be used for ^{38}K - g.s
Bake MPET vacuum chamber

Beamtime: Sep 11-14 2009

Beamtime

Try to perform resonances of highly charged ^{38}K and $^{38\text{m}}\text{K}$: if this is possible, the following systematic tests will be performed

- x) investigate development of both center frequencies with 5-4-3-2-1 ions per shot
- x) confirm that difference between ground state and isomer corresponds to 130.1(2) keV measured by Leach et al.
- x) measure f_c for ^{38}K without $^{38\text{m}}\text{K}$

Measurement of $^{38}\text{K}^{+q}$ versus $^{39}\text{K}^{+q}$

(since we plan to measure $^{38}\text{Ar}^{+q}$ versus $^{39}\text{K}^{+q}$ with the same configuration at a later point in time, a detailed documentation will be essential; otherwise systematic effects won't cancel in the determination of the Q-value)

Measurement of neutron rich K isotopes (HCI and/or singly charged)