UCN beamline operation

T.Lindner, March 2, 2016

This document is the standard of a description about how we will operate beamline 1U (UCN beamline).

Beamline control

Cyclotron Operations group will control the 1U beamline and kicker operation (since this also affects 1A beam intensities).

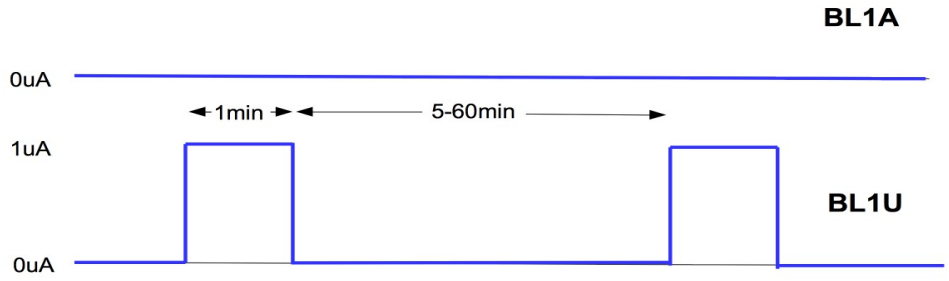
UCN group will provide input ("requests") regarding the kicker operation (such as changing the kicker mode or the 1min-beam-on/3min-beam-off UCN cycles).

Operating Modes

The core element of beamline 1U operation is that we will use the UCN kicker magnet to direct a fraction of the 1V beam to the 1U beamline instead of 1A. Normally this would mean cycling the kicker magnet rapidly to kick a fraction of the 1ms cyclotron buckets to 1U instead of 1A.

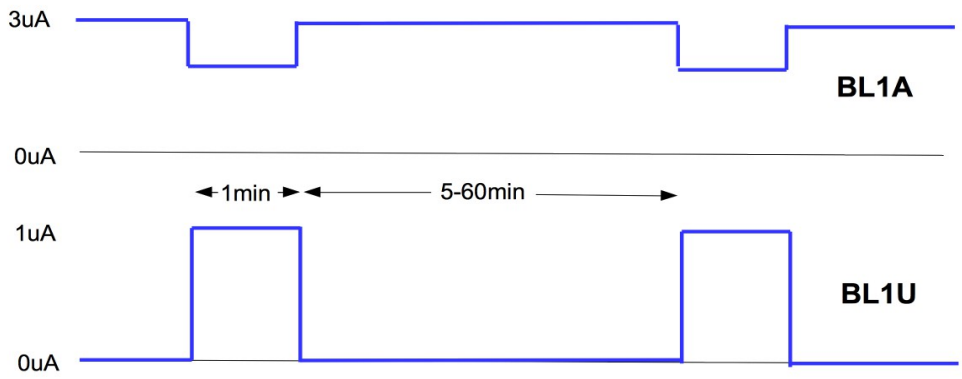
We envision that we will have a largish number of different option modes for beamline 1U. The following is a list of possible operating modes (possibly an incomplete list):

Initial commissioning (beam development mode): *We would want to have the kicker permanently on and running at low beam current for first tests of the BL1U transport elements. In this mode, there would be* ***no beam to 1A.***



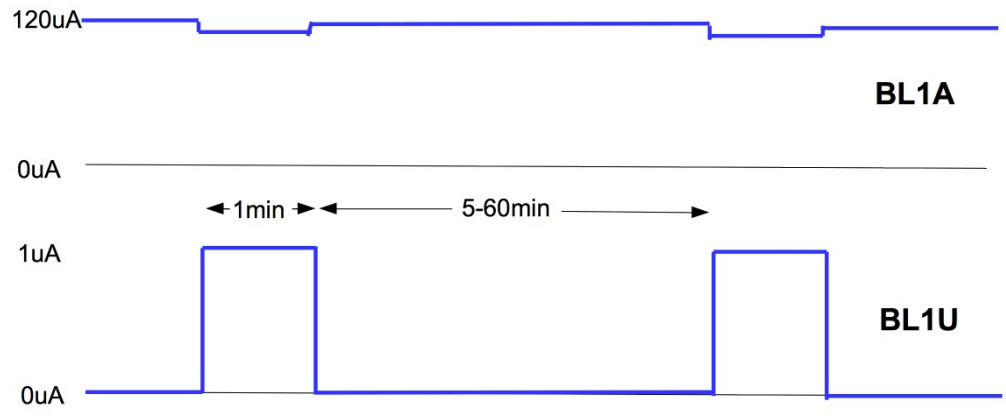
Drawing 1: Beam to 1A and 1U for initial commissioning

Main commissioning (still during beam development mode, perhaps): *The kicker would be cycling, but at low current (< 1uA). In this mode, there would be* ***some beam to 1A.***



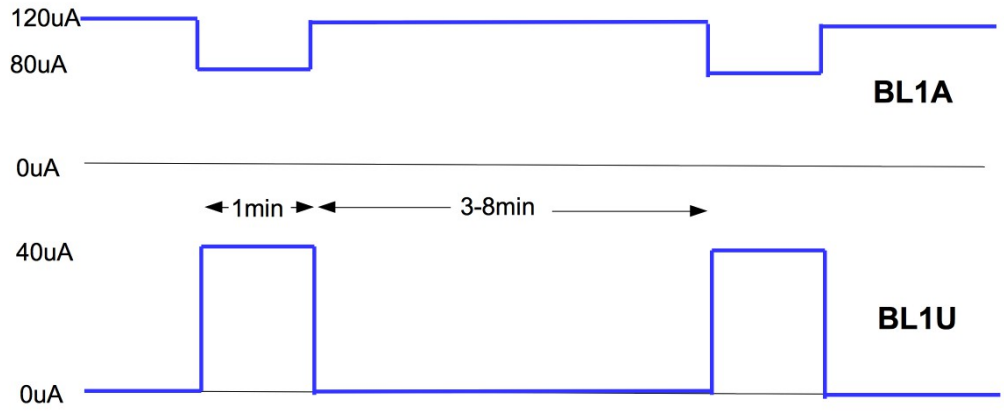
Drawing 2: Beam to 1A and 1U for main commissioning

•***UCN source development:*** *We may want to run in a mode where we occasionally asked for 1*mA *of kicked beam for 1 minute, then looked at the results for a while, then request another 1 minute ON. In this mode the beam to* ***1A would be normally 120uA, with occasional minutes of 119uA.***



Drawing 3: Beam to 1A and 1U during UCN source development

•***"Running" mode:*** *We would have a repeating cycle 10-40uA of beam for 1 minute ON and 3 minutes OFF. But we would still need flexibility in the details of this cycle. In this mode the beam to* ***1A would be normally 120uA, with periodic minutes of 80-110uA.***



Drawing 4: Beam to 1A and 1U during normal, full-power UCN operation

As mentioned before, all changes between UCN operations modes will be done by cyclotron ops; will need good communication between UCN group and ops.