

Rate estimation for Tritium Boiling Study

Shujie Li

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Goals

- 1. Target “boiling” i.e. density change wrt current
- 2. Target density change along z_{target} axis

7. Process Steps

For the physics of the experiment, it is important that changes to the density of the target be understood. The density of the cell may also be a function of position along the beam line (in beam Z).

1. Set the HRS to a high rate kinematics, which for the 2.2 GeV running, will be the quasi-elastic peak.
2. Set Beam Current to 5uA
3. Take empty cell data to determine the rate of scattering from the end-caps
4. Take data with one run for each gas cell with at least 100k events AFTER subtracting the end-cap contribution. This ensures that there will be enough statistics such that the density changes along the length of the cell can be studied.
5. Repeat steps 3) and 4) for 10 μA , 15 μA , and 20 μA . (minimum set)
6. Repeat steps 3) and 4) for 2.5 μA , 7.5uA, 12 μA , 17.5 μA and 23 μA . NOTE: If the very low current is problematic for the accelerator, increase to a larger value but try to be < 5 μA .

Kinematics

- Beam Energy: 4.3 GeV
- Physics: $x_{bj} = 1$, QE peak
- Targets: 2H, 3H, 3He gas cells, and empty cell (Aluminum)

- Phase-space cuts used in this estimation:
 - X' : 40 mrad
 - Y' : 20 mrad
 - Delta: 3.5%

Events-per-hour : z_target length (cm), 20 uA

