

Polarized ^3He Target — Emphasis on E02-013

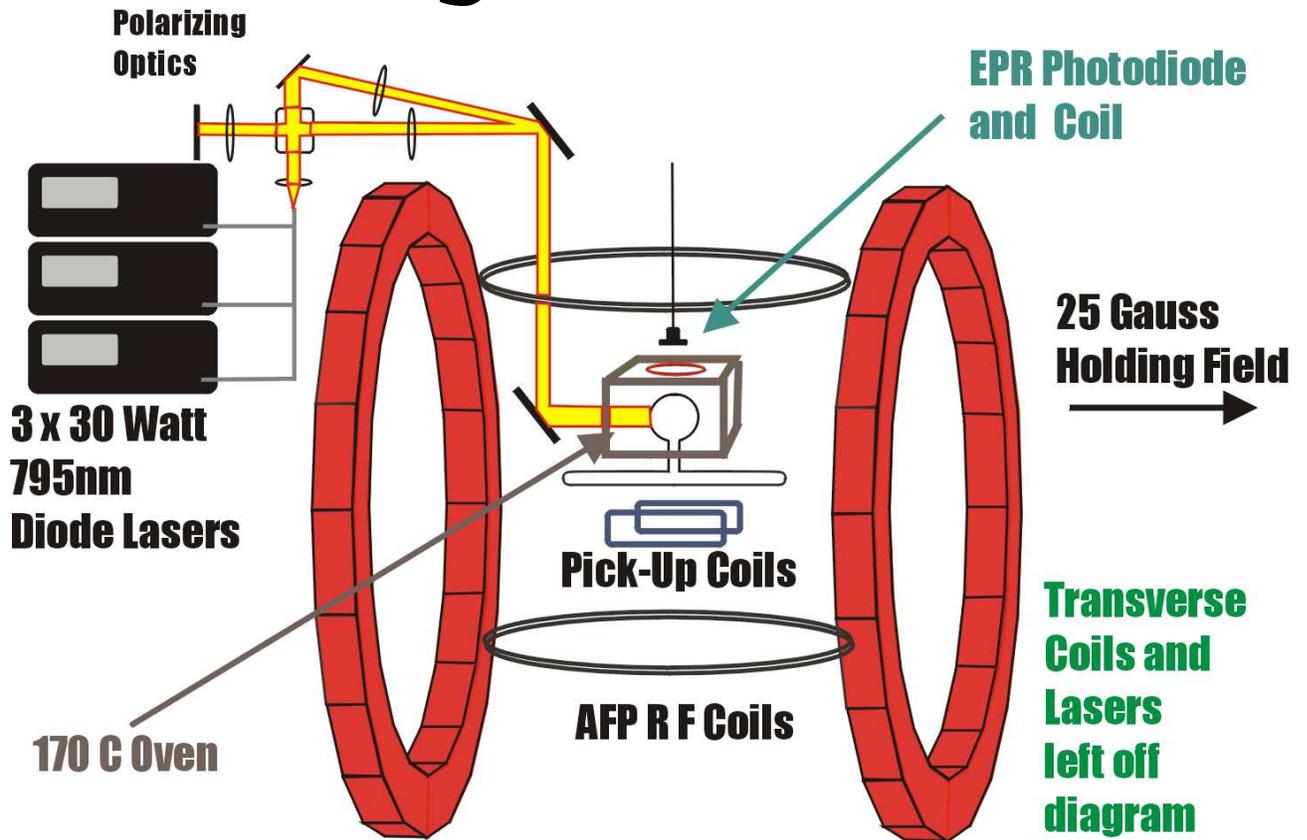
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Target Update for Hall A Collaboration

1. Old Target
2. New Target
 - (a) Reasons for New Target
 - (b) Overview of Design
3. 5–1 Combiner
4. Hybrid Technology
5. Recent Results
6. Status of Target Readiness

Old Target Schematic



New Target – Reasoning

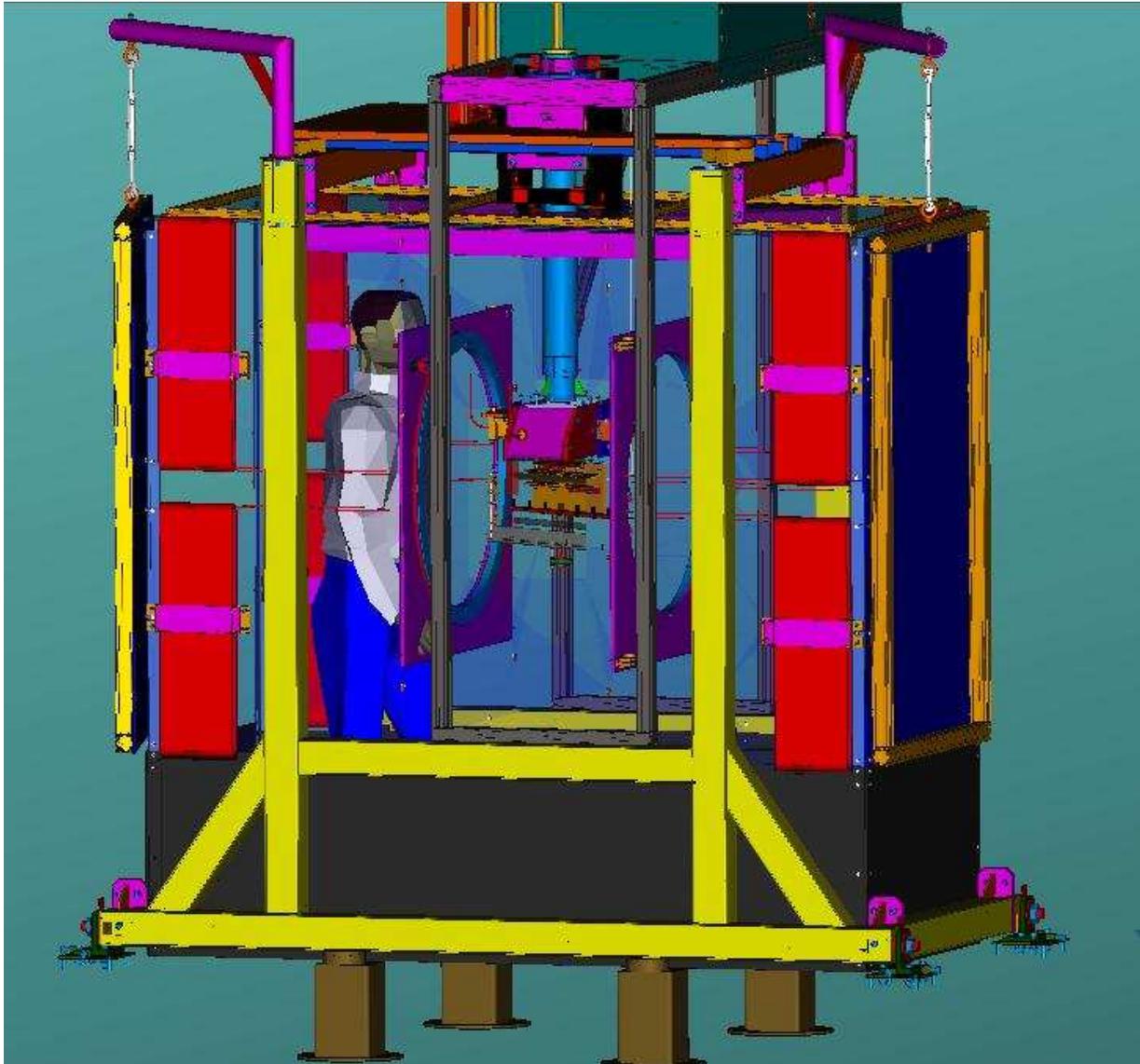
Need new design due to:

1. Position of BigBite
2. Stray fringe fields from BigBite

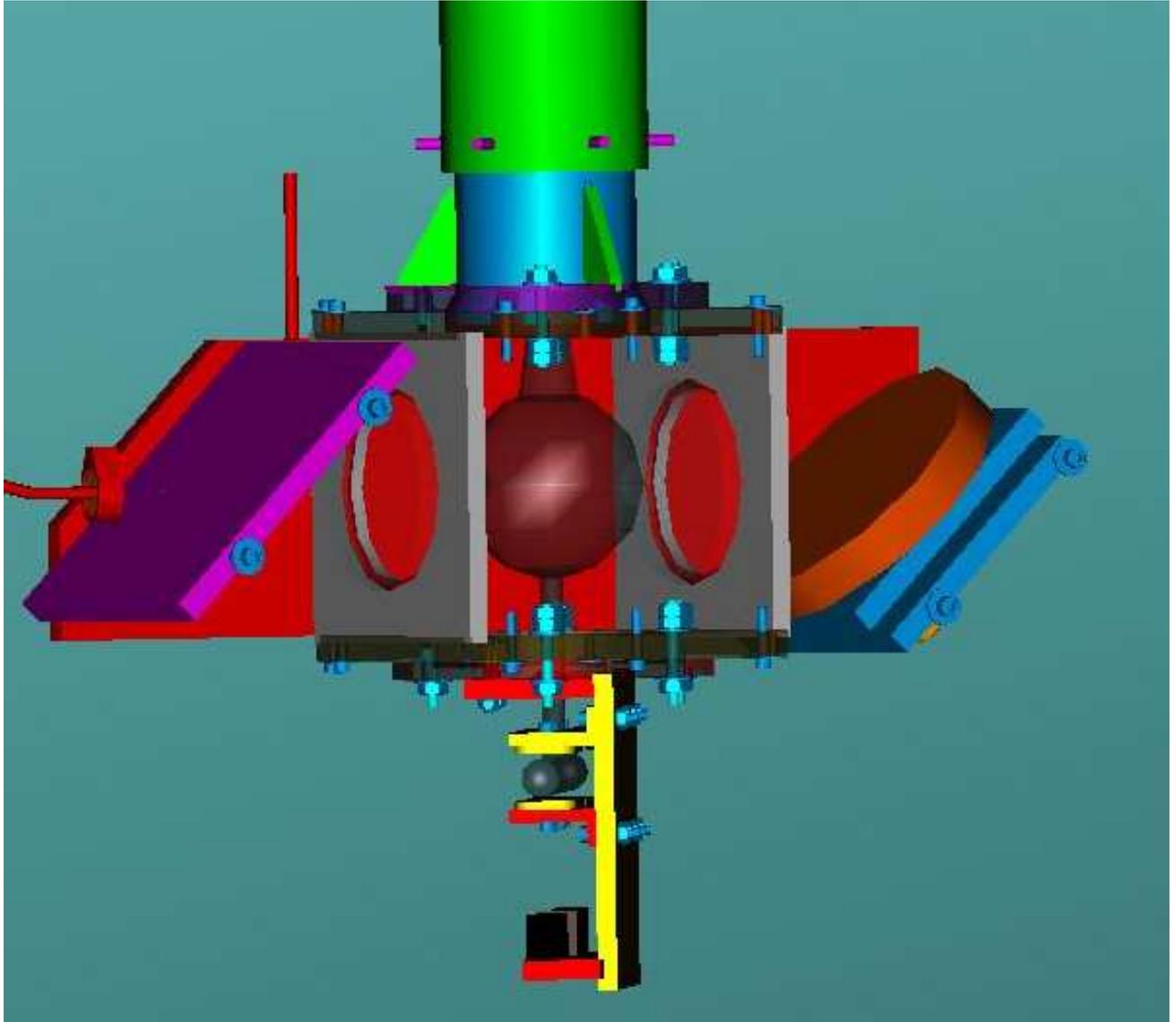
Solutions:

1. Remove laser hut
2. Use iron magnet box instead of Helmholtz coils

New Target – Design



New Target – Close Up



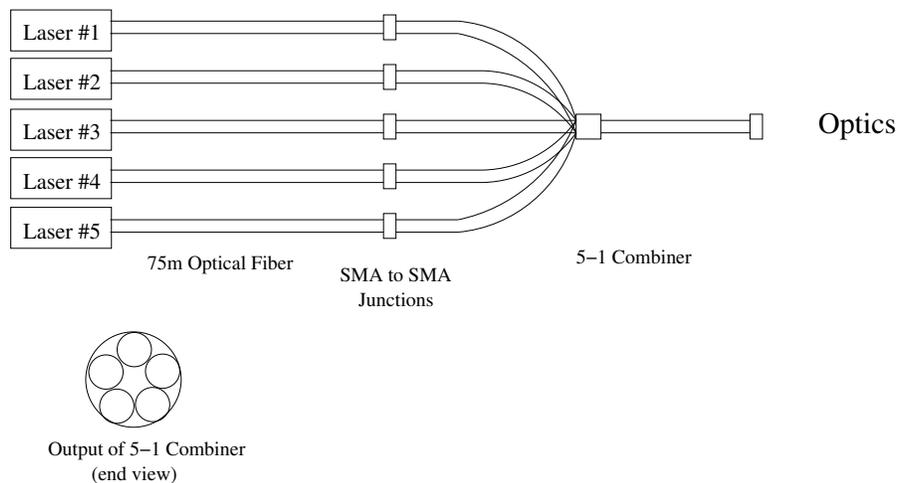
New Target – Changes to Design

1. Center support to aid in alignment of target
2. High temperature material for use with hybrid targets
3. Vertical Positioning of NMR pickup coils
4. Iron walls and smaller coils replace Helmholtz coils
5. Polarizing optics incorporated into target.
6. Larger oven to accommodate larger cells.

5-1 Combiner

Previous ^3He experiments required a laser building to polarize up to 7 laser paths for optical pumping.

BigBite's location made this difficult. This experiment will combine the laser light and require only 1 polarizing path.

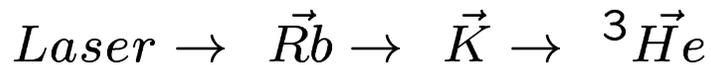


Hybrid Technology

Typically, the ^3He is polarized through spin exchange with optically polarized rubidium.



Recent work indicates there is a marked advantage in using a mixture of potassium and rubidium to pump the ^3He .



This approach results in a more efficient use of laser light and a faster time to ^3He polarization, which seems to result in a higher overall polarization in beam.

Recent Results

- **Hybrid Pumping** Both UVa and W&M have performed successful tests of hybrid pumped cells. Both sets of tests indicate a faster spin up time and higher overall polarization.
- **5–1 Combiner** Research into the optical characteristics of light from a 5–1 combiner was recently conducted at UVa. We can now produce a single, uniform spot of a desired size at a target location.
- **New Target** Have successfully energized magnet box and have seen first NMR signal produced in the G_E^n setup.

Status of Target Readiness – Cell Production

As of today, there 4 total high pressure target cells filled for G_E^n . In two weeks from now that number will be 6. Not all of these cells will be acceptable for use.

- **Deadline:** Measurements of maximum polarization and polarization lifetime of six acceptable cells by September 1.

Status of Target

Readiness – Target Preparation

We appear to be on track for our milestone of NMR measurement of a cell polarized in our setup in a near-final configuration before August 1. But we will only stay on track if parts are delivered on time.

- **Deadline:** August 1. Need to have
Laser light on hybrid cell in magnet box
Working oven at hybrid temperatures
Working NMR system