

K500 Operations and Development

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Introduction

During the 2005-2006 reporting period a total of 50 different beams, including 19 newly developed beams, were used for experiments. There were a total of 69 beam tunings not counting multiple tunes of beams for the SEE program. The SEE program will be treated separately.

Ion Sources

The plasma chamber of ECR2 was replaced in the fall with a new chamber in the fall of 2005. The 14-year-old 14.5 GHz transmitter began to fail almost immediately as recommissioning of the source began, and the klystron was finally replaced in February. During the January shut-down period the first focusing solenoid for ECR2 was replaced with one of the two Glaser lenses that had been constructed years earlier. The Glaser resulted in a significantly more sharply focused beam at the image point and higher transmission of beam through the defining slits. Progress on the ECR2 ion source will be described in a separate contribution.

Cyclotron Beams

Of the newly developed beams, a potassium beam is of note. This element was introduced into the ECR1 ion source via the low-temperature oven using a mixture of potassium chloride and calcium. A powder of calcium was produced by filing a rod of calcium metal. The calcium was immediately mixed with the potassium chloride using a mortar and pestle, the mixture was then placed in the oven, and the oven was placed in the source. The weight ratio of calcium to potassium chloride was approximately 1/1.

Operations

For the period April 1, 2005 through March 31, 2006, the operational time is summarized in Table I, while Table II lists how the scheduled time was divided. The only major repair that caused a significant loss of time was the replacement of an rf coupler. At the same time that the rf coupler failed a small water leak developed in the water jacket of an upper dee stem. Together the repairs cost three days of beam time.

Table I. 2005-2006 Operational Time.

| Time | Hrs. | %Time |
|------------------------|----------------|--------------|
| Beam on target | 5264.50 | 69.2 |
| Tuning, optics, set-up | 719.25 | 9.5 |
| Beam development | 538.50 | 7.1 |
| Scheduled maint. | 426.75 | 5.6 |
| Unscheduled maint. | 198.75 | 2.6 |
| Idle time | 460.25 | 6.0 |
| Cool down | 0.00 | 0.0 |
| Total | 7608.00 | 100.0 |

Table II. Scheduled Beam Time.

| Time | Hrs. | %Time |
|-----------------------|----------------|--------------|
| Nuclear physics | 1216.00 | 17.9 |
| Nuclear chemistry | 1784.50 | 26.2 |
| Atomic physics | 201.25 | 3.0 |
| Outside collaboration | 164.00 | 2.4 |
| Outside users | 2902.25 | 42.6 |
| Beam development | 538.50 | 7.9 |
| Total | 6806.50 | 100.0 |