K500 operations and development

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Introduction

During the April 2024 to March 2025 reporting period a total of 9 different beams, including 5 newly developed beams were used for experiments. The SEE program and the radioactive beams are treated separately in the progress report.

Ion Sources

The SEE beams continue to dominate the K500 schedule and both ECR1 and ECR4 ion sources were used for the K500 operations, with occasional help from the ECR3 ion source (also known as the Charge Breeding ECR (CBECR) ion source for radioactive beams), such as production of $^{78}Kr^{27+}$ for 40 AMeV SEE beam. The ECR3 ion source was crucial in getting the $^{64}Zn^{25+}$ ions for 47 AMeV beam production for an experiment in late March 2024. The sputtering technique that was developed for ECR3 for the zinc beam has been extended with a gold rod, and more intense 15 AMeV gold beam for SEE beam users is expected from ECR3. Charge state scans of ^{78}Kr, ^{64}Zn, and ^{197}Au from the ECR3 ion source are included in a separate writeup which follows this section.

Cyclotron Beams

Five newly developed beams are: 15 AMeV $^{5}HHe^{1+}$, 16.8 AMeV $^{10}B^{2+}$, 28.3 AMeV $^{14}N^{4+}$, 15 AMeV $^{64}Zn^{13+}$, and 12 AMeV $^{83}Kr^{15+}$.

Operations

For the period April 1, 2024 through March 31, 2025, the operational time is summarized in Table I.

Table I. 2024-2025 operational time.

Time	Hours	% Time
Science	1112	13
SEE Line	4117	47
Beam Development	929	11
Idle	0	0
Scheduled Maintenance	2488	28
Unscheduled maintenance	90	1
Total	8736	100