First Light At Beamline 4.0.1-2, the Elliptically Polarizing Undulator Beamline for Magnetic Spectroscopy

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INTRODUCTION

The Advanced Light has designed and is installing a new beamline, Beamline 4.0.1-2, which has been optimized for performing high resolution spectroscopy of magnetic materials. This beamline has an elliptically polarizing undulator (EPU) which can directly produce elliptically polarized x-rays, including both left and right circularly polarized radiation as well as horizontally and vertically linearly polarized x-rays. This undulator source is coupled to a high resolution plane grating monochromator providing a photon source size-limited resolving power of 5000-9000 in the energy range from 100 eV to 1500 eV. Finally, the beamline has a flexible end station system which will accommodate several end stations simultaneously.

BEAMLINE STATUS

Throughout the year significant progress was made in the construction and installation of the beamline. Important milestones, such as the installation of the mirror switchyard (the first beamline optics), were achieved early in the year. The front end was installed in August, and in September the insertion device was installed. On September 29, 1998, we achieved first light, delivering linearly polarized x-rays to a diagnostic chamber between the entrance slit and the main monochromator vessel. All optical elements have been procured and are awaiting installation. The end station system has also been installed. This system features removable experiment carriages which are coupled to a rotating stage. This arrangement will allow experiments to be prepared off-line and quickly attached to the beamline. It also provides for multiple end stations to be attached to the beamline simultaneously, which will enable rapid switchover between experiments.

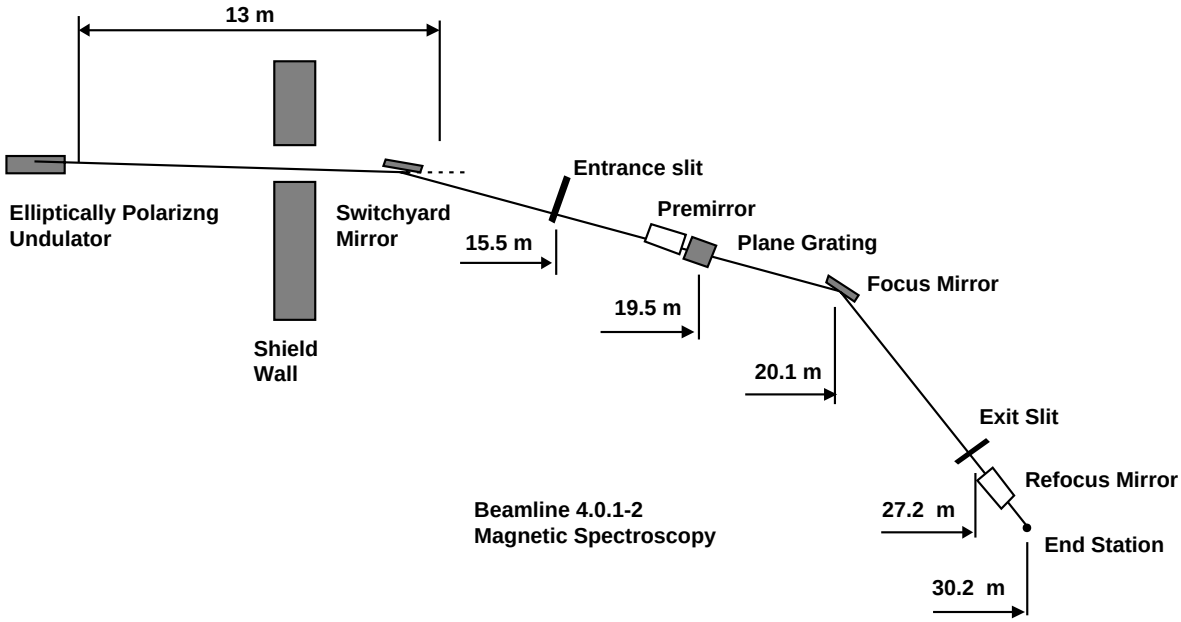

Figure 1. Schematic diagram of the Beamline 4.0.1-2. This beamline features an elliptically polarizing undulator and a high resolution variable included angle monochromator.

FUTURE WORK

Commissioning and checkout of the beamline has already begun, with preliminary evaluation of the undulator and beamline stability and performance underway. In the coming year we shall complete the installation of the monochromator, which has been delayed due to the manufacturing problems of an outside vendor. However, we anticipate the completion of the beamline in the summer of 1999, with user operations to commence in the fall.

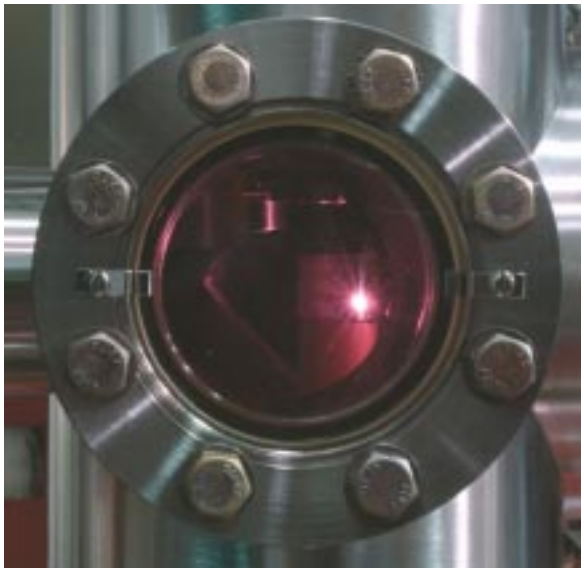

Figure 2. First light at BL4.0.1-2, observed at a diagnostic chamber downstream of the entrance slits.

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