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The Biomedical Imaging and Therapy Beamlines at the Canadian Light Source

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Abstract content

The synchrotron source provides a unique opportunity for biomedical research in both imaging and therapy research and applications. A general purpose biomedical research facility has been built at the Canadian Light Source in Saskatoon, Saskatchewan. The Biomedical Imaging and Therapy (BMIT) beamline complex at the Canadian Light Source is transitioning from construction to operations. The bend magnet beamline has been producing some results for over a year and we are now entertaining users in a Letter of Intent phase. The insertion device beam has been delivered into the POE-2 and SOE-1 experimental hutches. The BMIT facility has two beamline complexes; an insertion device source beamline at which the bulk of the imaging and therapy research on humans, animals, and plants will be carried out, and an ancillary bend magnet source beamline which will serve as a proof-of-principle facility and research tool for new methods of imaging and therapy. The bend magnet beamline is now being used for first experiments using conventional imaging and diffraction enhanced imaging). Several imaging methods (absorption-edge subtraction imaging, diffraction enhanced imaging / analyzer based imaging, phase contrast imaging, and absorption imaging) in projection and computed tomography modes as well as monochromatic beam and filtered white beam therapy methods will be available. The beamline overview and status along with examples of the types of research that are and can be carried out will be given. These examples will include a number of biomedical programs such as investigating lung function, a number of bone studies, tissue scaffold imaging, prostate cancer imaging, radiation therapy, and cardiac imaging. Some material science projects include imaging aluminum grain boundaries and visualizing aspects of fuel cell operation. Also, a number of technology development programs including new imaging methods or new approaches to imaging, detector development and high resolution dosimetry. Our plans in progressing toward large animal imaging and human research programs will be presented as well as some discussion on the challenges we face in realizing the full potential of the facility. Finally, a perspective of where the BMIT facility fits in world-wide to provide some context of the types of programs that are carried out at other synchrotron facilities.

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Summary

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