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Micro-Computed Tomography (MCT): A progress report

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The Micro-Computed Tomography (MCT) beamline is one of the first two beamlines to be constructed at the Australian Synchrotron as part of the BR-GHT program. This new beamline will be operational for user experiments by mid-2021. A report on the current status of the MCT project will be provided. MCT will complement the existing X-ray tomography capability provided by the Imaging & Medical Beamline (IMBL), targeting applications requiring higher (sub-micron) spatial resolution, with commensurately smaller field-of-view.

MCT is currently in the procurement phase, with particular emphasis being placed on the photon-delivery system (PDS). The key X-ray optical element in the PDS will be a double-multilayer monochromator (DMM). Detailed calculations related to the design of the DMM will be discussed, including important aspects which inform the possible choices for the multilayer stripes. The operational X-ray energy range (8 to 40 keV) and bandpass requirements for different imaging (including phase-contrast) modalities need to be considered. However, an appropriate choice of multilayer stripes also needs to be guided by practical issues such as: thermal and radiation-hardness properties of the materials involved; reducing surface roughness and thereby increasing reflectivity; reducing overall thickness to relieve possible stress and deformation; having grazing-incidence angles which are not so small that the mirror lengths and/or their separation become prohibitively large.

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