

BIODIFF detector array renewal: tackling even larger unit cells

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At the instrument BIODIFF, the incident wavelength can be freely selected between 2.7 Å and 5.6 Å. This is an essential unique feature of BIODIFF and allows it to adapt the wavelength to the unit cell size of the sample crystals. At a wavelength of 4.7 Å, unit cells with lattice constants up to 200 Å can be measured at BIODIFF. Up to now, only one other instrument in the world, MaNDi at ORNL, can perform high resolution structure determinations using neutrons on crystals with unit cells of that size. Recently, more and more proposals have been submitted with interesting projects that exceed this unit cell size. As the user community grows, the number of projects/proposals with larger unit cell crystals will continue to increase in the future. In order to serve such needs, it is essential to extend the capabilities of BIODIFF to allow data collection of larger unit cells. When using a longer wavelength - to counteract the reflex overlap on the detector in case of large unit cells - the maximum achievable resolution, will inevitably be cut. To overcome this limitation a new detector setup with a variable detector-to-sample distance should be realized. This will allow to compensate the reflex overlap on the detector for larger unit cells by increasing the detector-to-sample distance. Finally, this would enable the data collection from membrane protein crystals, a class of proteins so far not accessible to neutron single crystal diffraction due to their large unit cells.

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