Names/affiliations of Proposer(s): Colin Nave (Diamond Light Source) and Ian Robinson (UCL and Diamond Light Source)

Title of beamline: Coherent and sub micron focus x-rays for macromolecular crystallography

Science area to be addressed (MAX 100 words)
Structure determination of proteins by crystallography, particularly the most challenging problems which link structural biology at the molecular and cellular level. Coherent and sub micron focus x-rays combined with a detector having 5-10 times better angular resolution will give the following advantages.

- Better discrimination of signal to background and therefore higher resolution data
- Better handling of disorder (e.g. different unit cell lengths, twinning, poorly diffracting regions, very high orientational mosacity).
- Novel phasing methods from the speckle around and between diffraction spots.
- Exploitation of photo-electron escape to reduce radiation damage

Potential application areas of the research to be undertaken on this beamline. (Max 100 words)
Protein structure determination from marginal crystals particularly those from membrane proteins and multi-protein complexes, which play a central role in cellular operation. Present beamlines require crystal with 15-700 times more scattering power than theoretically possible (Holton and Frankel, 2010). The aim of the beamline is to obtain data which is limited by the quality of the crystal rather than the instrument performance. Discrimination between regions with different structure should also allow better structural models to be obtained. These developments will be of benefit for academic bio-medical research and for the pharmaceutical industry.

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Please note that Diamond hopes that by submitting this template you agree to participate in the preparation of an outline proposal.

Please indicate if this is not the case: ☐

Document to be returned to: diamond.science@diamond.ac.uk

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