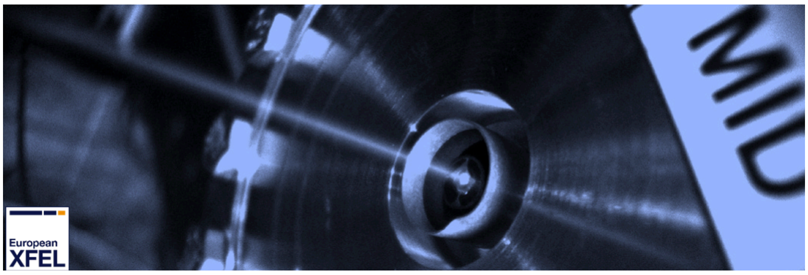

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Implications of High Photon Energy FELS for some areas of HED Science

Friday 20 January 2023 09:15 (20 minutes)

There are some implications of the provision of higher photon energies at x-ray FEL facilities that are obvious: increased photon momentum allows greater exploration of reciprocal space. This is evidently important in our understanding of liquids under high dynamic pressure, where greater momentum transfer allows us to go beyond mere density measurements to provide specific information about coordination numbers and so-forth. Similar arguments could be made for shocked or dynamically compressed solids - the expansion of reciprocal space under compression automatically pushes us to desire higher photon energies. However, in this presentation, which I emphasise is a personal view, I would like to take the general argument further. A good fraction of the HED science performed at FEL facilities has been undertaken under uniaxial compression conditions. Such conditions, by definition, keep the density-length product of the target of the interest constant, but also severely limit the compressions that can be achieved. Far higher compressions (and density-length, or density-radius) conditions could be achieved in convergent geometries, which are actually the work-horses of a great deal of HED research beyond FEL facilities, but for the Science of interest at FELs have received almost no attention. I will argue in this talk that, at the same time as arguing for higher photon energies, we ought to be considering promoting novel drive systems in convergent geometries that both require and can exploit higher photon energies.

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