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Steady State Microbunching in Storage Rings - Proof of Principle Results at MLS

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Coherent radiation is a powerful scheme for storage ring based synchrotron radiation sources as its intensity increases with the square of the number of radiating electrons (N˜107) instead only linearly as in common storage ring based light sources. Formation of bunches or sub-bunches shorter than the radiation wavelength is necessary for the radiation from different electrons to add in phase and therefore cohere. Recently at the MLS it was shown that in a dedicated isochronous optics an electron beam energy modulation induced by an externally applied laser in an undulator section leads to the formation of sub-bunches with a length of 1 µm one turn later. It was proven that these micro- bunches radiate coherently in that same undulator at exactly that wavelength. This is the first step towards the so called “Steady State micro Bunching”concept (SSMB) for storage rings proposed by Alex Chao and Daniel Ratner in 2010 as a new type of synchrotron light source.

Presenter: Dr FEIKES, Jörg (Helmholtz Berlin)

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