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Investigating the Microbunching Instability at Diamond Light Source

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Diamond Light Source is a third generation synchrotron facility dedicated to producing radiation of outstanding brightness. Above a threshold current, the electron bunches are susceptible to a phenomenon known as the microbunching instability. The key feature of this instability is the emission of coherent radiation bursts, which have wavelengths of the order of the bunch length and smaller. The bursting at the threshold is emitted quasi-periodically, however increasing to a higher current results in the bursting to appear random in nature.

The high frequencies involved in these emissions make characterizing the phenomenon a challenging task. A setup at Diamond has been built, dedicated to the investigation of this phenomenon. An overview of the project will be presented, including a description of the instability, the experimental setup, and recent results.

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