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## Exploring second harmonic generation in hard X-ray self-seeding FEL

*Monday 2 June 2025 16:00 (2 hours)*

Recently, the Hard X-ray Self-Seeding (HXRSS) setup at the European XFEL has been successfully demonstrated, achieving routinely pulse energies in the seeded signal of several hundreds of microjoules at various wavelengths. However, the shorter wavelengths pose a challenge to the impulse response of crystal, limiting output radiation and spectral performance. To address these challenges, a strategy combining HXRSS with second harmonic generation and tapering has been proposed. We have conducted the Start-to-end simulations at 15keV and compared the output of the pulses with direct seeding at fundamental harmonic and seeding combined with 2nd harmonic. Tapering further improves energy conversion efficiency, leading to increased pulse energy and enhanced signal to noise ratio.

### Footnotes

### Paper preparation format

### Region represented

Europe

### Funding Agency

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