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[214] Turbulence-inclusive Modelling of Electron-Cyclotron Wave-Plasma Dynamics in Tokamaks

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Electron-cyclotron waves are widely used for plasma heating and current drive in tokamaks. The possibility of very localised deposition renders them appealing for instability mitigation and tailored control. However, previous work¹ indicates that simulations overlooking turbulence effects tend to significantly overestimate the method's efficiency. The discrepancy with experimental results is believed to stem from two effects²: microwave beam broadening due to turbulent plasma density fluctuations and wave-enhanced turbulent transport of suprathermal electrons.

This project aims to couple two codes, WKBeam³ and LUKE⁴, to simulate both effects simultaneously for the first time, yielding a comprehensive understanding of the combined dynamics. Experimental validation at the TCV tokamak is also envisioned.

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