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The ARES Linac as a Precision Tool for Accelerator Science, Technology and Application Developments

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The generation and acceleration of ultra-short, high quality electron beams have attracted more and more interest in accelerator science. Electron bunches with these properties are necessary to operate and test novel high-resolution diagnostics and advanced high gradient accelerating schemes.

The dedicated R&D linac ARES at DESY (Deutsches Elektronen-Synchrotron) is now fully operational and able to produce and diagnose these electron beams at the nominal energy of 155 MeV and to deliver them to users. First measurements have shown an outstanding energy stability and reproducibility with a relative energy stability of $1E-5$.

ARES is also used for medical experiments in the frame of Very High Electron Energy (VHEE) treatment and FLASH radiotherapy with living cells and animal phantoms.

This contribution gives an overview of the linac, describes the three experimental stations and summarizes the beam parameter measurements. The scientific program at ARES includes accelerator R&D, medical studies and industrial applications and is outlined.

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