Contribution ID: **438** Contribution code: **THPB015** Type: **Poster Presentation**

Validation of high efficiency klystron technology

Thursday 29 August 2024 16:00 (2 hours)

The delivery of high RF power—from hundreds of kW to MW—by klystrons, is linked with a high overall energy consumption. A research programme led by CERN in collaboration with the industry is being conducted to understand what limits klystron efficiency and how to develop high-efficiency klystrons. As a result of this program, two first prototypes of X-band (11.994 GHz) high-efficiency klystrons have been successfully designed and manufactured in collaboration with Canon Electron Tubes and Devices. The first results look promising, revealing a remarkable ˜60% efficiency, and validating the proposed HE klystron technology. A comprehensive characterisation campaign has been conducted at CERN to verify and demonstrate these results. The methodology for the HEK tubes characterisation is based in two independent measurements: a RF power measurement, and a calorimetric methodology —less subject to calibration inaccuracies. We describe the setups, principle of the calorimetry methodology, and we discuss the feasibility and precision of the results.

Footnotes

Funding Agency

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Session Classification: Thursday Poster Session

Track Classification: MC4: Technology: MC4.6 RF power sources and power couplers