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# High-Efficiency 12GHz Klystron Design for CLIC Project

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The CLIC project (Compact LInear Collider) requires the conditioning of 120000 cavities with high-power 12GHz-klystrons. My PhD project is the design of such a high-efficiency klystron. I work firstly at the enhancement of a Thales 4.9GHz-klystron to increase its efficiency.

A klystron is a linear-beam vacuum tube that amplify or generate a RF signal. An electron stream is created with a gun and confined by an external magnetic field. The beam modulation is triggered by the RF signal in the input cavity ; the electrons velocities along the drift tube change with the phase of the signal. The beam is then modulated into a set of electron bunches by the gain cavities. The electrons release their kinetic energy in the form of a RF signal at the output cavity. The electrons are finally absorbed in the collector.

In order to validate experimentally our high-efficiency klystron (or "Kladistron") concept, we are working at the enhancement of the electrons bunching. With more cavities than in a standard klystron, we can obtain a smoother beam current growth and a better bunching. We currently focuse on the Thales TH2166 klystron by changing its interaction line of 6 cavities; our simulations lead us to a 16 cavities design. We keep the other elements of the TH2166 klystron: the electron gun, the solenoid, the collector, the input and output cavities.

We finished the cavities design and the blue prints of the prototype cavities; we will start the test in May 2016. We will test our first Kladistron at Thales Velizy by the end of 2016; these preliminary results will help us in the 12GHz Kladistron design. We are also studying instabilities phenomenons, bunching enhancement and multipactor.

**Auteur principal:** MOLLARD, Antoine (CEA)

**Orateur:** MOLLARD, Antoine (CEA)

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