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Study of the electron transport for the FEL beam line COXINEL experiment using a beam produced by plasma laser acceleration.

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The COXINEL experiment aims to demonstrate the free electron laser amplification with an electron beam produced by laser plasma acceleration.

For this, a transport line was designed and prepared at the Synchrotron SOLEIL. It consists of three permanent magnet quadrupoles with variable gradient (QUAPEVAs), a demixing chicane, a second set of electromagnetic quadrupoles and a 2 m undulator. This line was installed at the LOA.

The laser plasma acceleration regime, carried out in an injection by ionization in a gas jet, was initially chosen to commission the transport line.

The electron beams produced in this regime are stable, have a wide energy spectrum (50-250 MeV) and a wide divergence (several mrad depending on their energy), the properties of the beam have been controlled and manipulated using different optics along the transport line. The beam was characterized every 1-2 m.

We present here the measurements carried out on the COXINEL line with the first observation of the radiation of the undulator at 200 nm. These results are compared with numerical simulations, using a homemade tracking code.

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