



Contribution ID: 55

Type: talk

## Study of the electron transport in the COXINEL FEL beamline using a laser plasma accelerated electron beam

*Wednesday, 27 September 2017 16:00 (15 minutes)*

The ERC Advanced Grant COXINEL aims at demonstrating free electron laser (FEL) amplification based on laser plasma accelerator (LPA) source. Due to the large energy spread and high divergence, in comparison to conventional accelerators, a 10 m long transport line was designed to preserve and improve the beam qualities. A triplet of permanent magnet variable gradient quadrupoles (QUAPEVA) handles the large divergence. The slice energy spread is reduced by a magnetic chicane. A set of electromagnetic quadrupoles provides a chromatic focusing in a 2 m long undulator. A reference model was established and sensibility to parameters studies were carried out.

Electrons were transported through the line for the LPA with ionization assisted self-injection (broad energy spectra up to ~220 MeV, few milliradians divergence), and with shock-injection, where energy spread is much smaller (few percent). Beam position and dispersion are controlled precisely thanks to specific beam based alignment method using displacement of the QUAPEVA magnetic center. The transported energy range was also controlled using a slit inserted in the chicane. Experimental results and numerical simulations are in a good agreement.

**Primary author:** ANDRE, Thomas (Synchrotron SOLEIL)

**Co-authors:** Mr LESTRADE, Alain (Synchrotron SOLEIL); Dr LOULERGUE, Alexandre (Synchrotron SOLEIL); Mr MAHIEU, Benoit (LOA); Mr HERBEAUX, Christian (Synchrotron SOLEIL); Mr SZWAJ, Christophe (PhLAM); Mr EVAIN, Clément (PhLAM); Mr THAURY, Cédric (LOA); Mr BRIQUEZ, Fabien (Synchrotron SOLEIL); Mr MARTEAU, Fabrice (Synchrotron SOLEIL); Mr BOUVET, François (Synchrotron SOLEIL); Mr BLACHE, Frédéric (Synchrotron SOLEIL); Mr LAMBERT, Guillaume (LOA); Mr ANDRIYASH, Igor (Synchrotron SOLEIL); Mr DUVAL, Jean-Pierre (Synchrotron SOLEIL); Mr GAUTIER, Julien (LOA); Mr TAVAKOLI, Keihan (Synchrotron SOLEIL); Mrs LABAT, Marie (Synchrotron SOLEIL); Dr COUPRIE, Marie-Emmanuelle (Synchrotron SOLEIL); Mr KHOJOYAN, Martin (Synchrotron SOLEIL); Mr VALLÉAU, Mathieu (Synchrotron SOLEIL); Mr SEBDAOUI, Mourad (Synchrotron SOLEIL); Mr EL AJJOURI, Moussa (Synchrotron SOLEIL); Mr HUBERT, Nicolas (Synchrotron SOLEIL); Mr LECLERCQ, Nicolas (Synchrotron SOLEIL); Mr MARCOUILLÉ, Olivier (Synchrotron SOLEIL); Mr N'GOTTA, Patrick (Synchrotron SOLEIL); Mr ROMMELUERE, Patrick (Synchrotron SOLEIL); Mr CORDE, Sebastien CORDE (Laboratoire d'Optique Appliquée); Mr BIELAXSKI, Serge (PhLAM); Prof. MALKA, Victor (LOA); Mr DIETRICH, Yannick (Synchrotron SOLEIL); Dr TA PHUOC, kim (LOA)

**Presenter:** ANDRE, Thomas (Synchrotron SOLEIL)

**Session Classification:** WG4\_Parallel

**Track Classification:** WG4 - Applications of Compact and High-Gradient Accelerators