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## Status report on modification of a 5 MeV electron photo-gun for generating vortex electrons at JINR

*Tuesday 3 June 2025 16:00 (2 hours)*

At the Joint Institute for Nuclear Research (JINR), we use an RF photo-gun generating electrons via UV laser-driver and accelerating them up to 5 MeV to make a source of the so-called vortex electrons with a quantized orbital angular momentum projection onto the propagation axis. Such electron beams with a low current have previously been obtained only at electron microscopes with the highest kinetic energy of 300 keV. If successful, this gun would be the first such source in the MeV energy range in the world that could further be used, for instance, as a source for the 200-MeV electron linac at JINR. We discuss the needed steps to achieve this goal and report on the results already obtained. In particular, we have modified the laser driver and obtained twisted light beams in the deep ultraviolet wavelength range with different values of the topological charge. The vorticity of the photons is expected to be transferred to electrons via photoemission. We also discuss alternative schemes with a magnetized cathode, usually employed for angular-momentum dominated beams which are classical counterparts of the vortex particles.

### Footnotes

### Paper preparation format

Word

### Region represented

Europe

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