



Contribution ID: 829 Contribution code: TUPA136

Type: **Poster Presentation**

Development of a backside laser-heated toroidal electron gun using a lanthanum hexaboride emitter.

Tuesday, 9 May 2023 16:30 (2 hours)

We have been developing a backside laser-heated thermionic electron gun with a tripolar tube structure for a compact electron accelerator driven neutron source. A lanthanum hexaboride (LaB₆) emitter is heated by irradiating a near-infrared laser light transported by an optical fiber to the back of it in this electron gun even though there was no heater wire. The LaB₆ electron source with a diameter of 8 mm is heated by irradiating near-infrared light with a wavelength of 980 nm at 127.6 W. As a demonstration of the electron gun, a high voltage of -5 kV was applied to the cathode and a pulsed voltage of 200 V to a grid electrode. As a result, we successfully generated an electron beam up to 6.45 mA. This demonstration was the world's first operation of a cathode-back laser-heated triode thermal electron gun as far as we can tell. In order to increase the beam current, the electron gun is being upgraded by improving the cathode holding structure and introducing a precise laser alignment system. The latest results of this research will be presented at the conference.

Funding Agency

Footnotes

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Yes

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Session Classification: Tuesday Poster Session

Track Classification: MC3: Novel Particle Sources and Acceleration Techniques: MC3.T02: Electron Sources