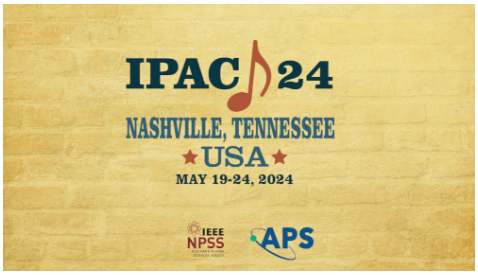

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DBR-SL-GaAs surface charge limit observation and suppressing for EIC high charge polarized source

Wednesday, 22 May 2024 16:00 (2 hours)

The research and development (R&D) of the polarized electron source for the EIC has made significant progress this year. We achieved an 11 nC bunch charge of the polarized electron beam. One challenge we faced was the surface charge limit of the Distributed Bragg Reflector (DBR) GaAs/GaAsP Super Lattice (SL) photocathode. We suppressed this effect by optimizing the surface doping and heating procedures. We also tested increasing the charge by expanding the emission area but found it could not be linearly scalable. In this report, we will discuss the surface charge limit mechanism and model the surface charge limit using the diffusing equations, one for diffusing the excited electrons to the surface and another for surface-trapped electrons diffusing to the ground.

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