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Metal-based photocathode materials able to sustain high currents ZHAOZHU LI, KAIDA YANG, JOSE RISO, ROSA LUKASZEW, William and Mary College — Existing photocathode technology may not meet the various requirements for long photocathode lifetime, high current and repetition rate, high polarization and/or low emittance that are required for next generation light sources and nuclear physics accelerator capabilities, particularly for electron ion colliders (EIC). Specifically, next-generation light sources will need MHz repetition rates with high charge, high energy, low emittance, and a very high repetition rate while new EIC proposals stipulate hundreds of mA of current. Metallic photocathodes offer several advantages over present semiconductor photocathodes for these stringent requirements but also exhibit low QE. Coupling to the surface Plasmon polariton (SPP) modes on the metal surface offers an ideal solution to decrease the optical penetration depth and reduce the metal reflectivity thus leading to higher QE. We will present our results exploring metallic photocathode performance by enabling Surface Plasmon Polariton excitation as well as the use of adequate over-layers since it has been shown that this can also reduce the work function thus enhancing QE.

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