**OPERATIONAL EXPERIENCE OF PHOTOCATHODES FOR HZDR SRF GUN**

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### HZDR SRF Gun-II

- 1.3 GHz 3.5-cell cavity
- Very reliable and stable user operation since 2019
- 2019-05-2021: 280 user shifts, ~ 3420 h
- 4 MeV CW beam with 200 - 250 pC and 50, 100, 250 kHz rep. Rate

- 20 cathodes → 2 Cu, 12 Mg (QE~0.1%), 6 Cs2Te (QE~1%)

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### NC cathode into SC cavity

- NC photocathode isolated from the cavity
- Cooled down with liquid nitrogen
- Designed for an easy exchange of the cathodes in the cold gun
- Precise positioning ±0.6 mm
- DC bias to suppress multipacting.

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### Mg cathodes in SRF Gun-II

- 12 x Mg cathodes worked in SRF gun II since 2016
- QE ~ 0.2-0.5 × 10⁻³ @ 262nm after laser cleaning
- Stable, long lifetime in SRF gun
- Dark current ignorable at 7 MV/m (E_{cathode} = 13.3 MV/m)
- Strong Schottkey effect

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### Cs₂Te cathode in SRF Gun-II

- Solve overheating problem by using copper substrate
- Operation in SRF gun since 2020.05
- QE ~1%, deliver dark current ~ 30 nA @ 8 MV/m
- Cathode transport led QE degradation

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**References**