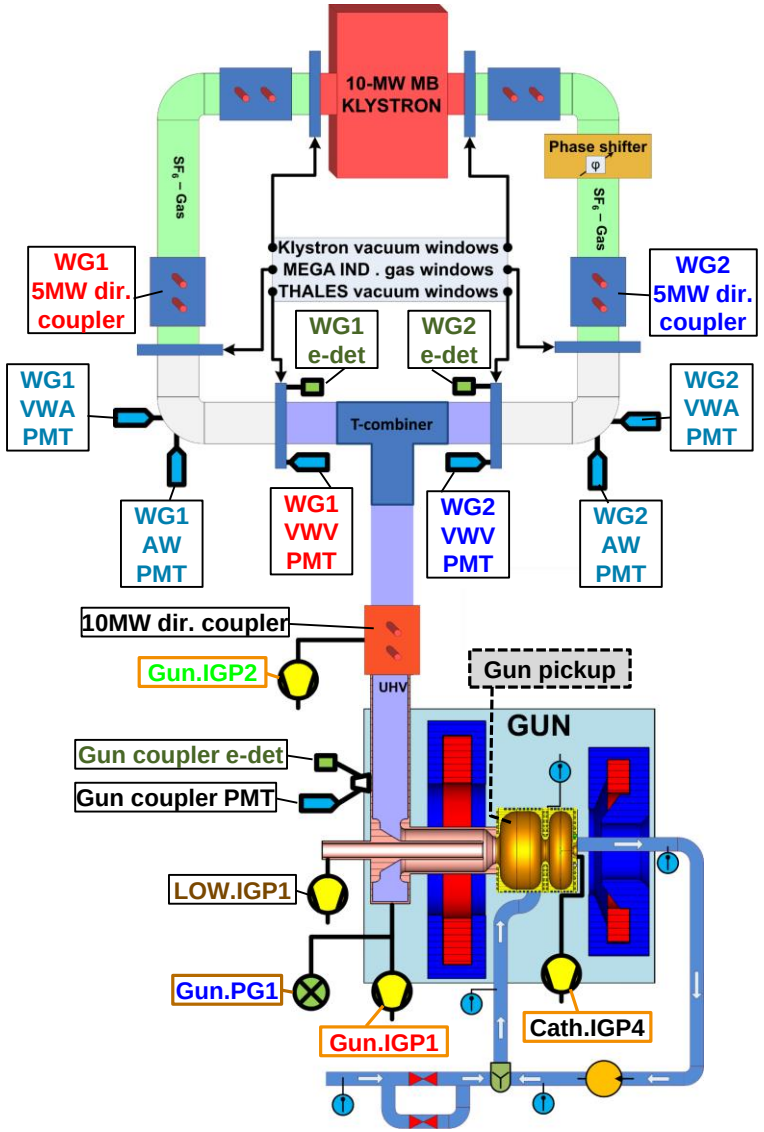
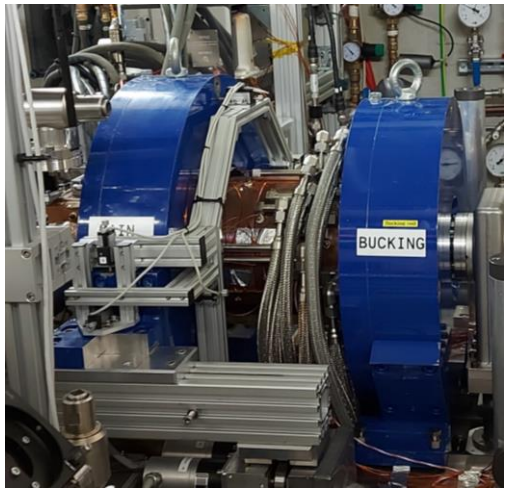
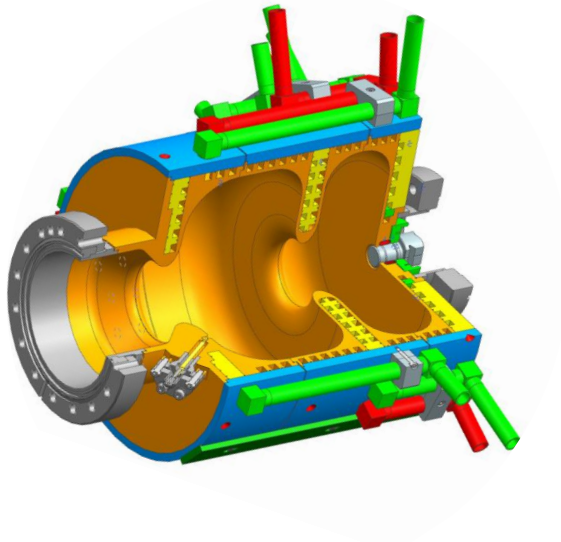
Gun5.1 at PITZ: RF conditioning and first characterization

M. Krasilnikov for the PITZ team

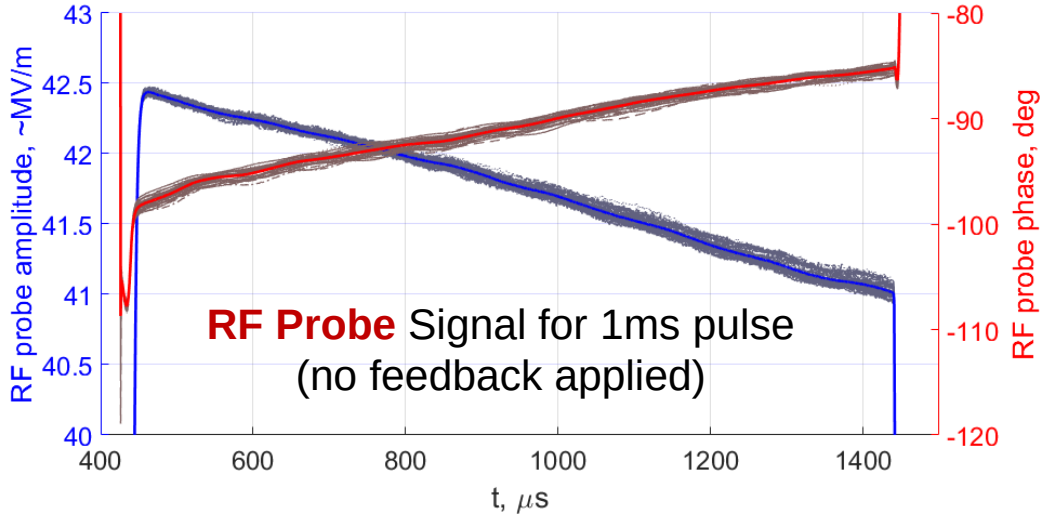




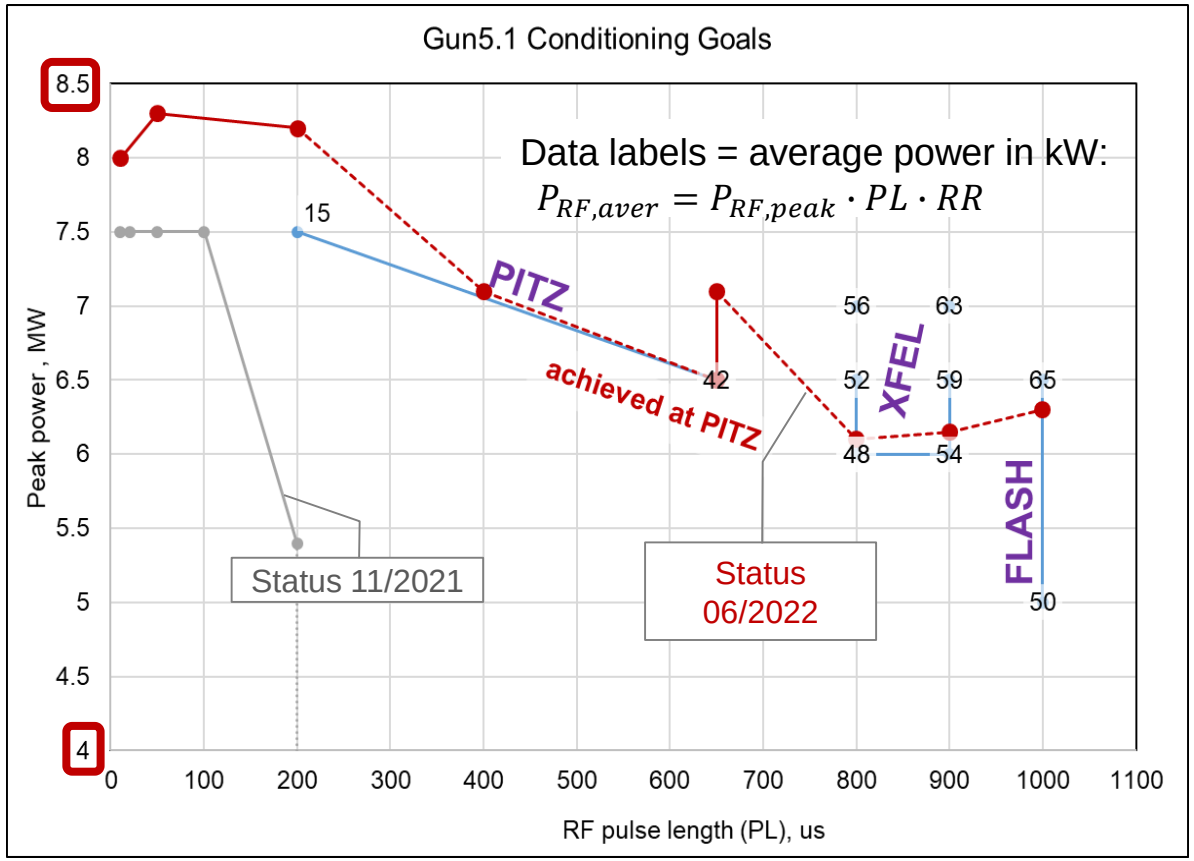


1st prototype of new generation of NC 1.3 GHz RF gun for FLASH and European XFEL:

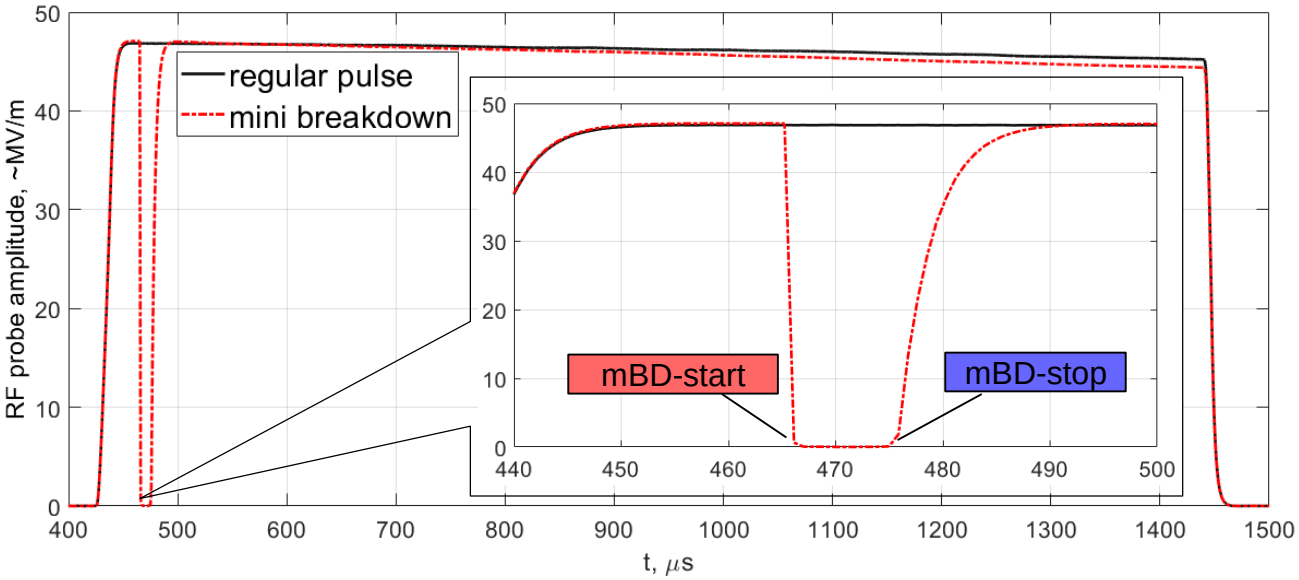
- up to **1 ms** at **10 Hz** repetition rate
- high gradients Ecath~**60 MV/m**
- elliptical **shape** of cells / irises / cathode hole
- Improved **cooling**
- **RF probe** in the full cell

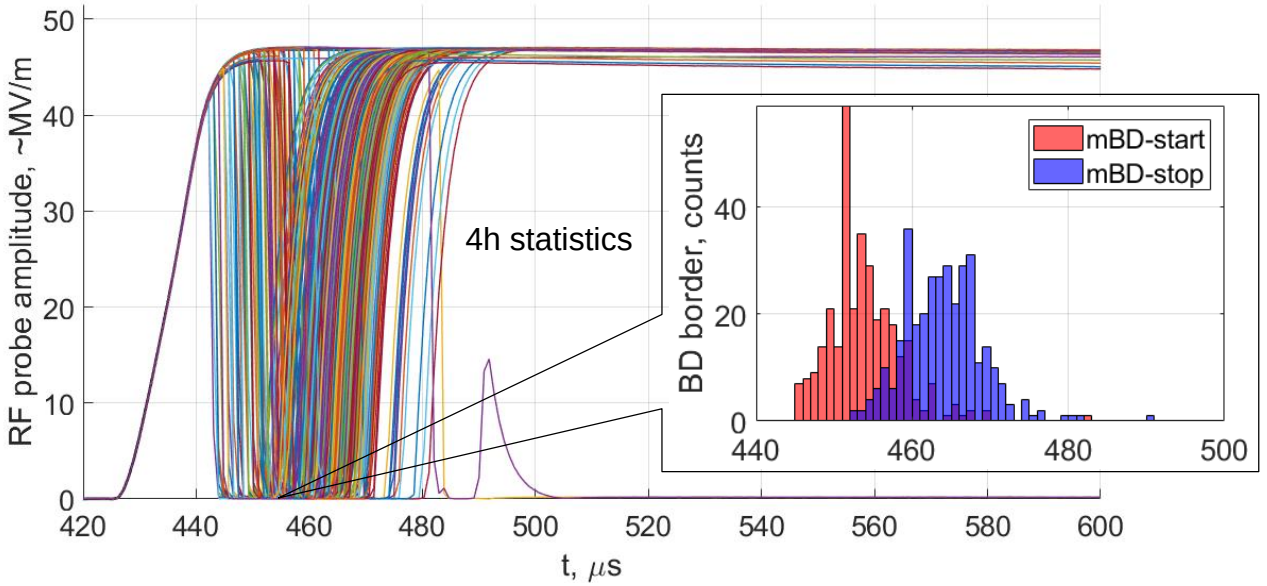


Gun5.1 at PITZ: RF conditioning

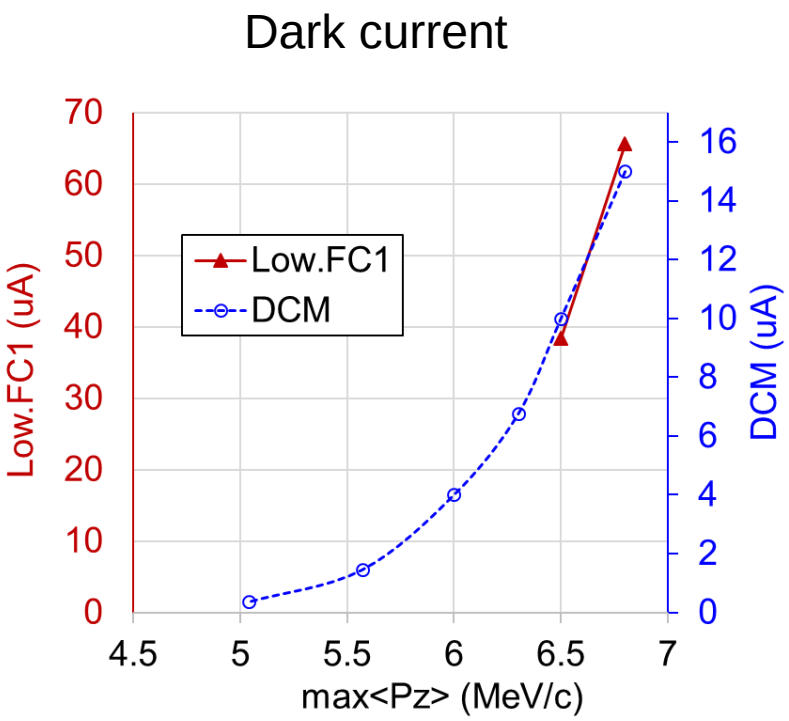


Mini-breakdown events

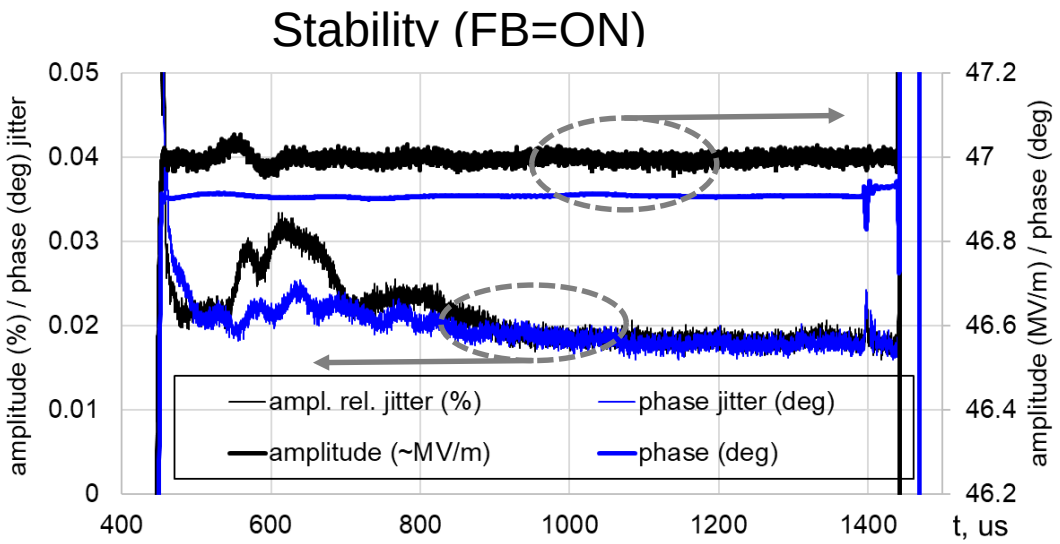




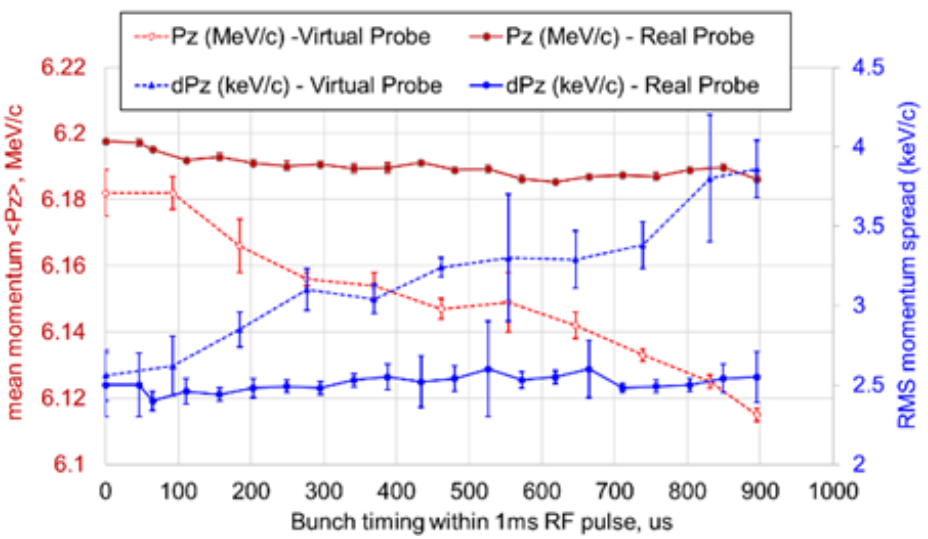
Gun5.1 at PITZ: first characterization



Comparison with the corresponding dark current measurements for Gun4.2 demonstrates a **reduction** of a factor **3 to 5**.



Shot-to-shot rms jitter (500 shots):
- amplitude **~0.02%**
- phase **~0.02 deg** (~40 fs)



Beam stability along the RF pulse
- $\langle P_z \rangle$ at MMMG for **1ms** pulses
- Virtual probe (10 MW DC) versus RF pickup (real probe)

Linear slope $\frac{1}{\langle P_z \rangle_0} \left| \frac{d\langle P_z \rangle}{dt} \right|$

real probe 0.0016 $(ms)^{-1}$→ :
- **×7 smaller** than virtual probe (0.011 $(ms)^{-1}$)
- **significantly better** than for Gun4.1 with a virtual probe (2021): 0.021 $(ms)^{-1}$ within a 200 µs pulse