Sheath acceleration up to $5 \times 10^{21}$ W cm$^{-2}$
@ Kansai Photon Science Institute

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- Upgraded J-KAREN-P $\rightarrow$ ~PW (30 J, 30 fs) on target
- Commissioning expt.: sheath acceleration 250 TW, $5 \times 10^{21}$ W cm$^{-2}$
- Max. proton energy regularly $> 40$ MeV, up to ~54 MeV $\@ 2 \mu$m foil
- Measured *sheath intensity scaling* $@ \sim 0.1$ Hz – increasing energy gives $E_p \sim I_L^{1/2}$ scaling
- *Electron temperature saturates* at ultra-high intensity & small focal spots $\rightarrow$ insufficient acceleration length

![Graphs showing electron temperature and proton energy intensity scaling](image)