Poster No: C1

SHINE
SHANGHAI HIGH REPETITION RATE XFEL AND EXTREME LIGHT FACILITY
硬X射线自由电子激光装置

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Target Studies for High-Repetition-Rate Muon Source Based on Electron Accelerator

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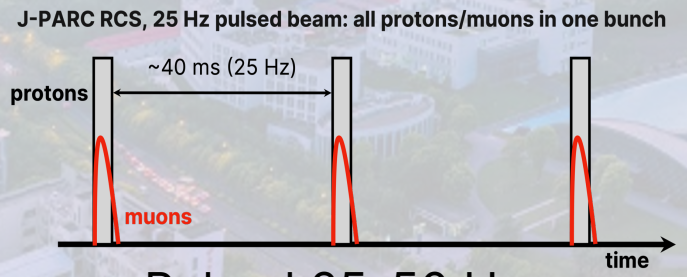
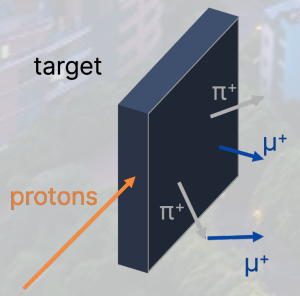
- Developing novel electron-beam-driven muon source with a unique time structure.
- Simulation study to estimate beam properties and intensity.

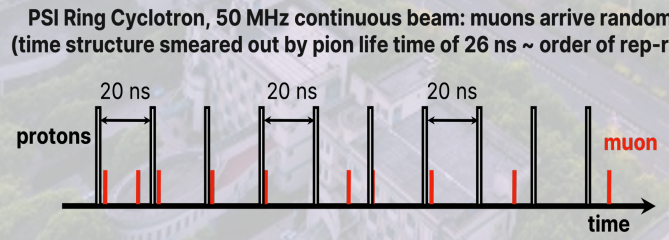
Conventional muon sources

$$p + p \rightarrow p + n + \pi^+$$
$$p + p \rightarrow p + p + \pi^+ + \pi^-$$
$$\pi^+ \rightarrow \mu^+ + \nu_\mu$$



Pulsed 25-50 Hz

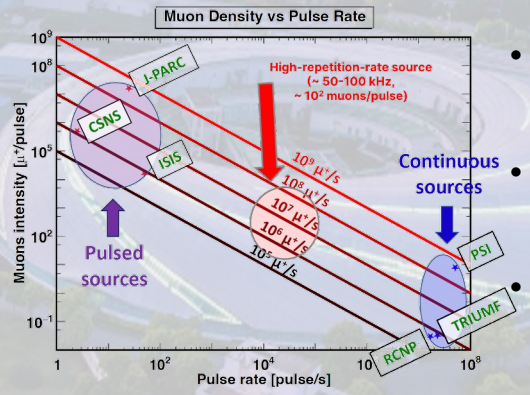




DC

Repetition rate is essentially limited to these two

High-repetition-rate muon sources



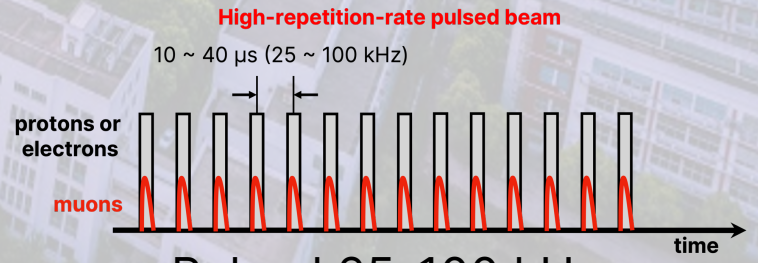
- Not ideal time structure for specific types of experiments (e.g. μSR)
- Typical measurement period: a few muon lifetimes ~ 10 μs
- State-of-art superconducting linac can provide high-repetition-rate electron beam

Photo-nuclear process

$$e^- + Z_1 \rightarrow Z_1 + \gamma$$
$$\gamma + Z_2 \rightarrow \pi^\pm + Z_3$$

Bethe-Heitler process
(Dimuon production)

$$e^- + Z_1 \rightarrow Z_1 + \gamma$$
$$\gamma + Z_2 \rightarrow \mu^+ + \mu^- + Z_2$$



Pulsed 25-100 kHz