With LIGHT to highest ion beam intensities and shortest ion beam pulses

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TARGET NORMAL SHEATH ACCELERATION (TNSA):
intense ion source: $10^{11} - 10^{13}$ protons in $< 1$ ps
low emittance: < 0.01 mm mrad transversal, $10^6$ eV s longitudinal [4,5]
huge accelerating field gradients: MV/μm

**Approximation**

- rf power > 200 kV
- 3 gaps
- acceleration voltage ± 1 MV
- 108.4 MHz
- injection into rf at -90° synchronous phase

**Simulations on energy compression**

**Double Spiral Resonator**
- rf power > 200 kV
- 3 gaps
- acceleration voltage ± 1 MV
- 108.4 MHz
- injection into rf at -90° synchronous phase

**Experimental Results**
- measurement with RCF and spectrometer
- ΔE/E = 2.7% ± 1.7%
- $ΔE = 1.7 \times 10^3 ± 15%$

**Phase focusing with the rf cavity**

**Detector for Short Proton Pulses**
- pcCVD diamond detector (13 μm thick, 1 mm radial area, impedance matching for fast readout)

**Phase focusing of 8 MeV/u Protons**
- mean pulse length as a / μs:
  - modulation of a Gaussian pulse profile with detector response function
  - $ΔE/Δt = 6 \times 10^{-3}$ μs pulse length of 50610 μs
  - $I = 1 \times 10^8$, $I = 3000$ μA

**Generation and Transport of Heavy Ions successfully demonstrated**
- formation of multitude of peaks due to bunching in cavity
- energy gain particle number lower as for protons because of overall lower generation efficiency

**References**

**Outlook**

2017
Further improvement of heavy ion beam
improving homogeneity of proton beam (high energy feature)

2018
Reconstruction of the LIGHT experimental area

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