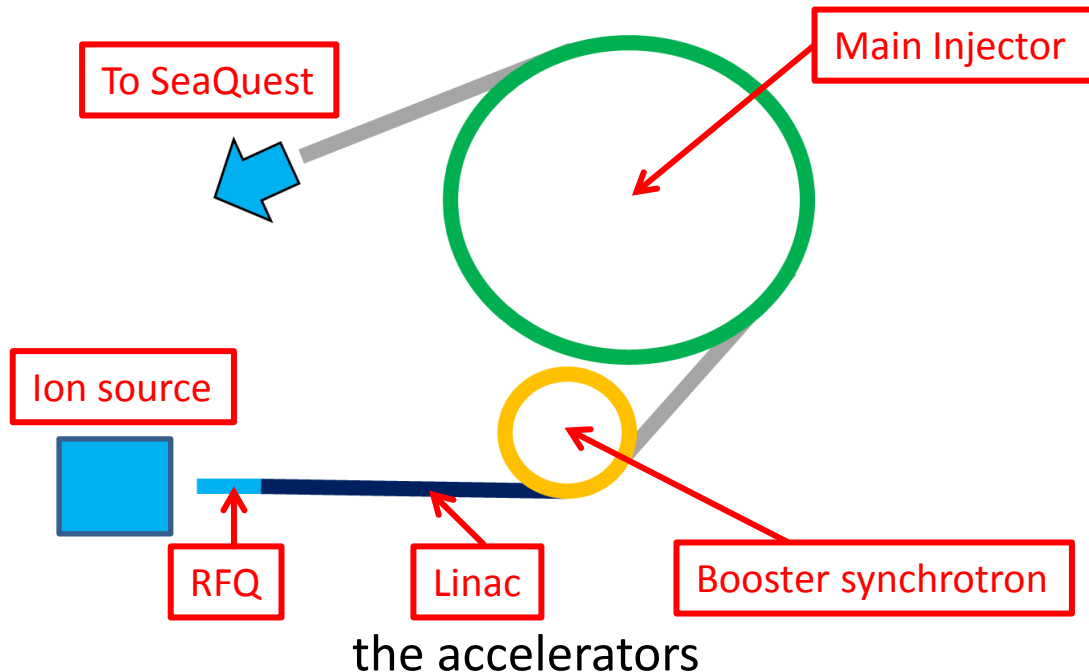


Acceleration and Extraction of the proton beam for SeaQuest Experiment

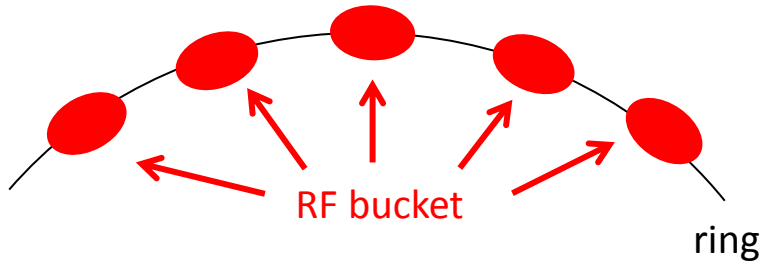
Yasufumi Kunisada 15M01110 Shibata Lab. May 16th, 2015

- Particle accelerators are important devices in particle and nuclear physics.
- They have been developed during the past 100 years.
- The purpose of SeaQuest Experiment is to measure the structure of the proton.
 - 120 GeV (99.997 % of the speed of light) proton beam is used.



- Synchrotron (Main Injector) at Fermilab is used.
- The proton is accelerated in stages to 120 GeV using 4 different accelerators.

- In the ring of a synchrotron, there are bunches of protons called “RF bucket.”



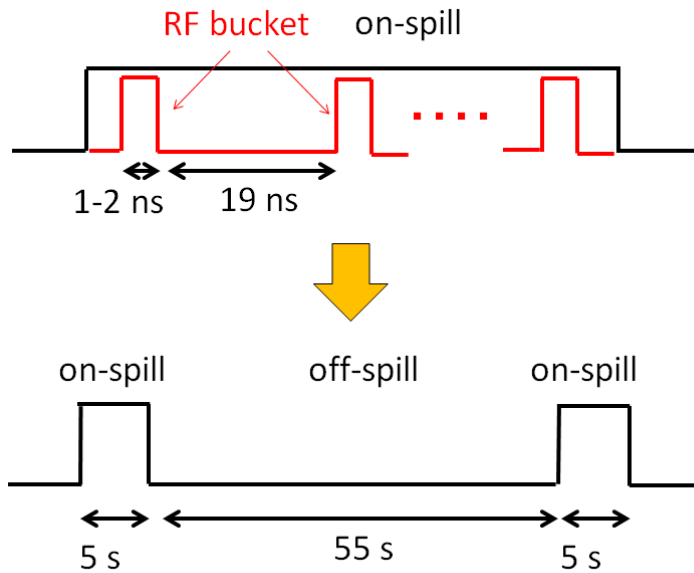
Main Injector

Circumference : 3.3 km (11 μ s at light speed)

The number of RF bucket : 588

Time between RF bucket : 19 ns

- Proton beam is extracted from the Main Injector by “slow extraction” method.
- “Slow extraction” is extracting proton beam little by little.
- The time structure of the extracted beam is as follows:



- The proton has a pulse structure because of RF bucket.
- 1 RF bucket has 4 million protons on average.
- The number of protons in RF bucket is required to be constant for a steady experiment.
- on-spill period is 5 s.

In the poster, I will show the details of the acceleration and the time structure of the proton beam.