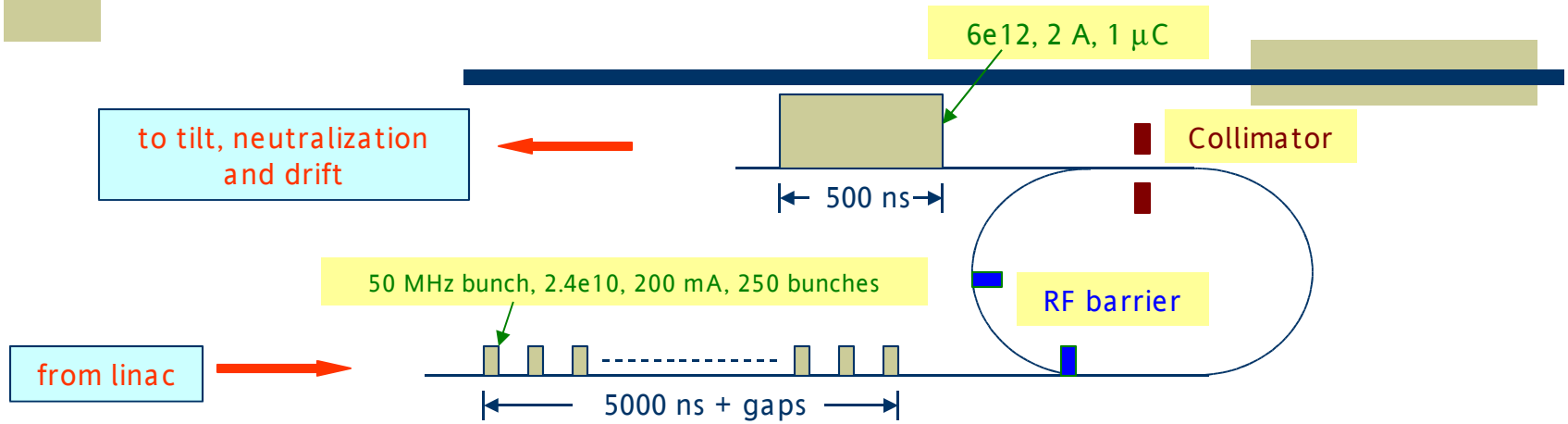
Observations

- Observation 1:
  - Goal: To create an extremely intense short bunch at low duty factor
  - 20 MeV, 1 μC, 1 Hz: beam power = 20 W
  - Beam loss is non-issue
  - This is very different from those high power (~ MW) hadron accelerators like SNS, PSR, ISIS, J-PARC, GSI, RIA, etc.
- Observation 2:
  - Limited budget
  - Hardware needs to be as simple and realistic as possible

Ring Compressor for Transverse Stacking



- Ne^{+} 20 MeV, $\beta = 0.045$, $A = 20.17$, $B\rho = 2.84$ T-m
  - Warm combined function magnet: B = 1.9 T, ρ = 1.5 m, L(mag) = 9.4 m, C = 12 m
  - SC magnet: B = 4 T, ρ = 0.7 m, L(mag) = 4.5 m, C = 7.5 m
- 10-turn stacking
  - Injected linac beam width: 5000 ns, or 67.5 m
  - Extracted beam width: 500 ns, or 6.75 m
- Transverse phase space painting during 10-turn injection (similar to CERN PSB)
- RF barrier to preserve extraction gap
- Space charge induced resonances may not have time to cause damage (similar to non-scaling FFAG)
- IBS may not have time to cause dilution
- Beam halo scraping by physical aperture is ok (or use collimator for localizing loss)
- Beam parameters similar to that of existing proton linacs and rings
  - Injected 50 MHz bunch: 2.4e10 (200 mA), 1π mm-mrad
  - Beam in the ring: 6e12 (2 A)
  - Extracted beam: 2 A × 500 ns = 1 μC
- Drift compression 250-500:1

Questions and Answers

- Vacuum requirement:

  10^{-7} torr (Sessler/Yu; GSI SR reaches 10^{-11} torr)
- Outgassing from lost ions:

  Collimator to control ion loss
- Energy tilt for longitudinal compression:

  Downstream induction linac to obtain $\Delta E/E = \pm 14\%$
- Space charge – Laslett tune shift:
  - HEDP/Fermilab Booster = 3.7
  - Emittance growth simulation for tune shift ratio = 3.2 ($\Delta\varepsilon/\varepsilon \sim 50\%$ in 10 turns)