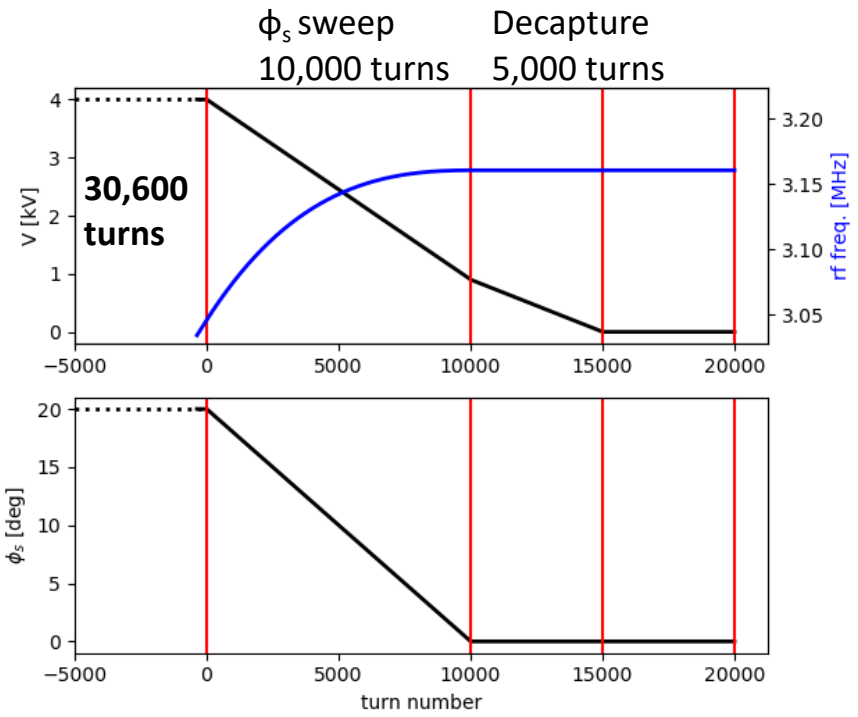
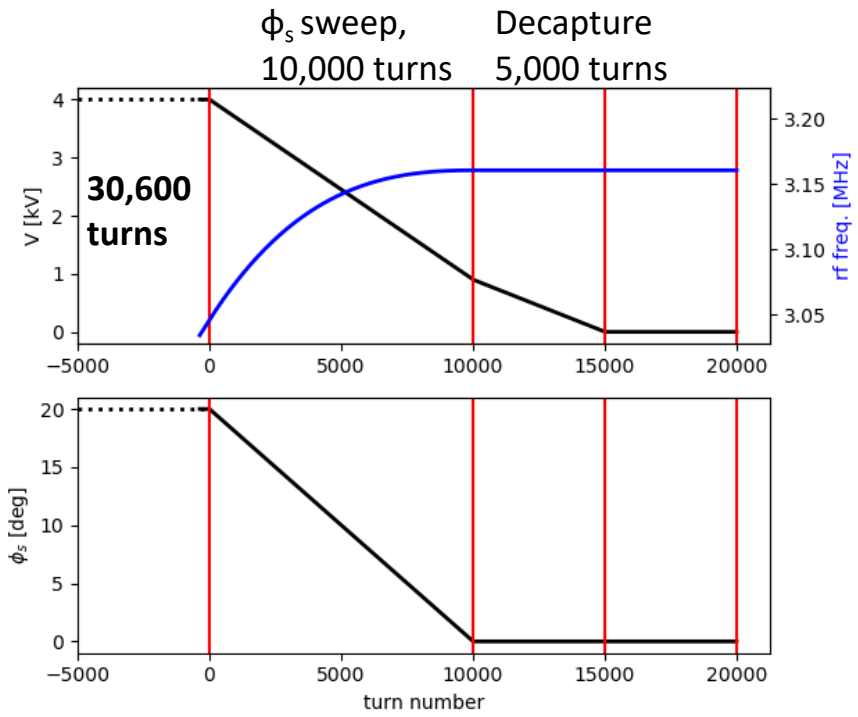
Beam stacking: RF program

David Kelliher, 16/12/2022

Stacking at the top

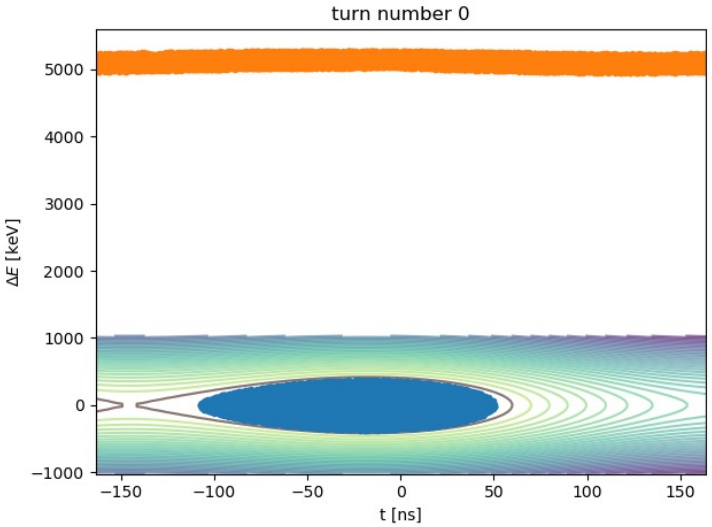


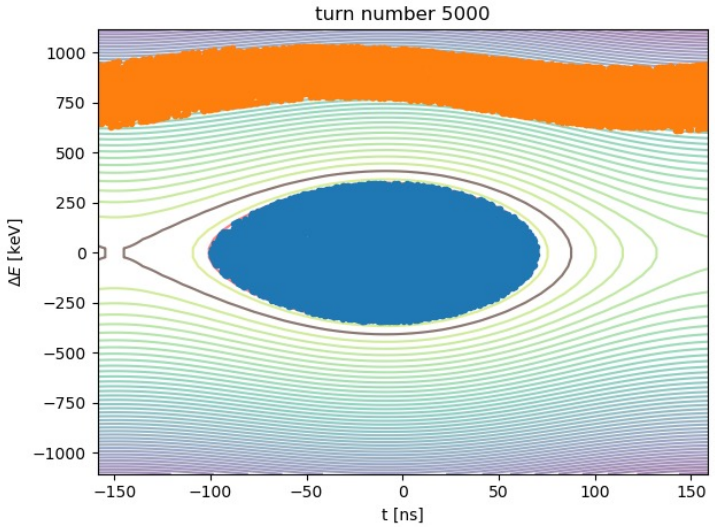
RF program for first beam
Final energy is 57.98 MeV

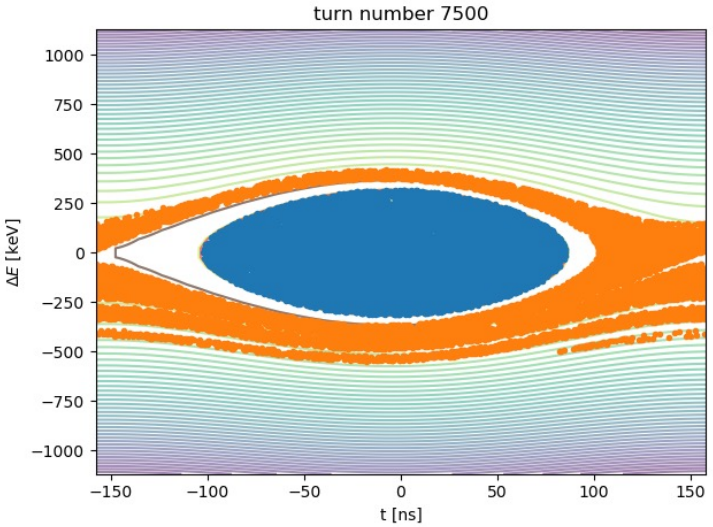


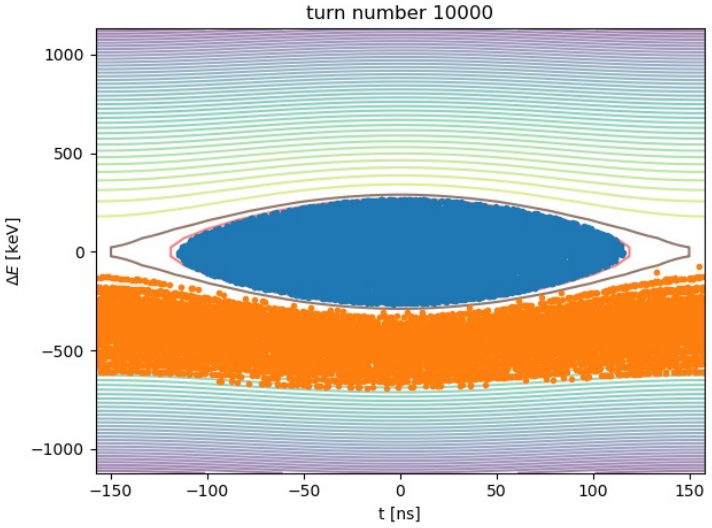
RF program for second beam
Final energy is 57.98 MeV

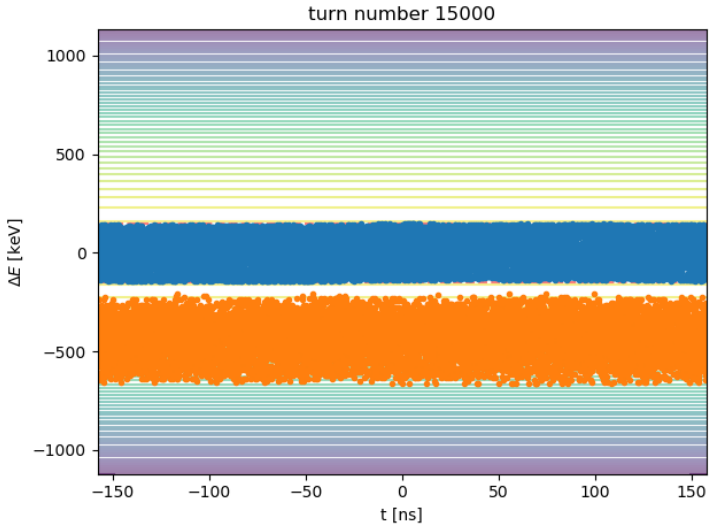
Stacking at top









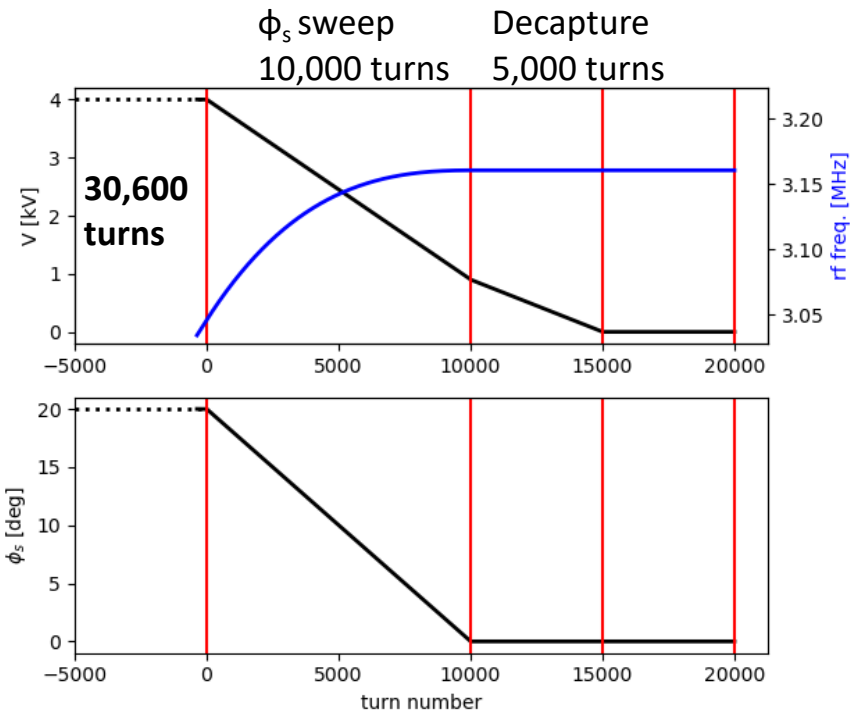


Final energy spread coasting
Beam 1: 458 keV
Beam 2: 296 keV

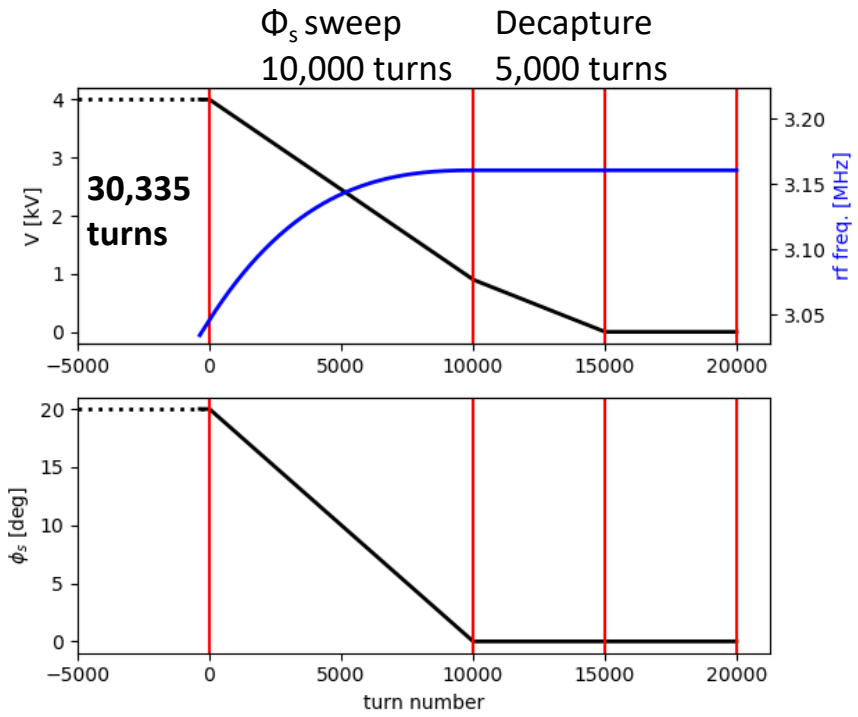
Total spread: 814keV

Assuming 4kV capture voltage and ideal capture, the maximum energy spread allowed is ~780keV

Stacking at the bottom

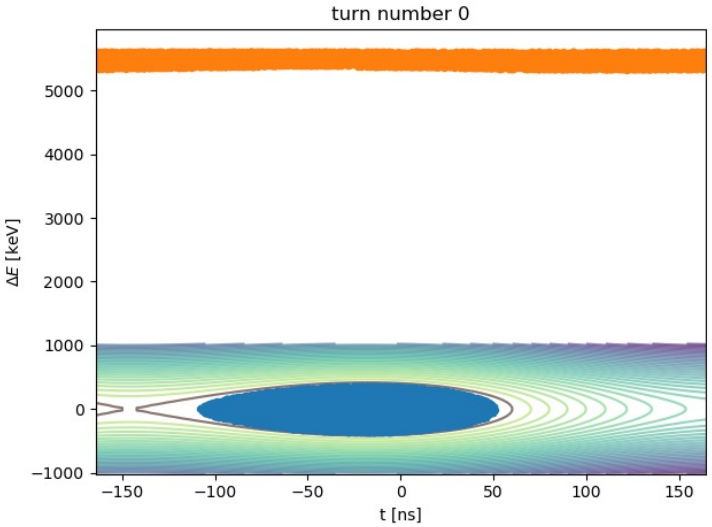


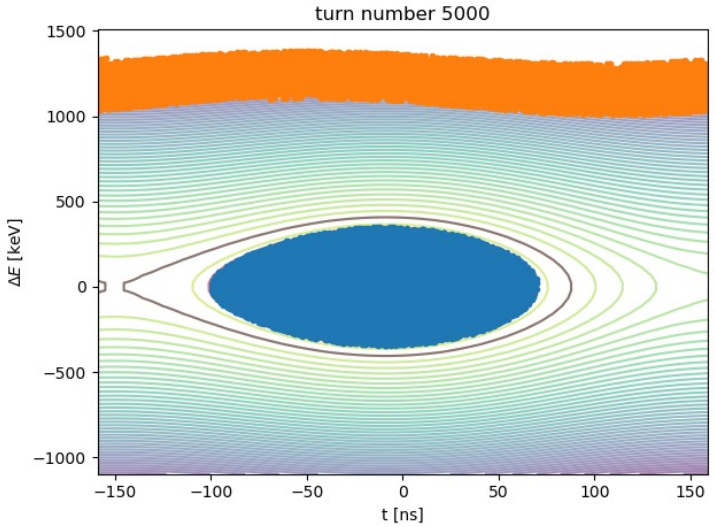
RF program for first beam
Final energy is 57.98 MeV

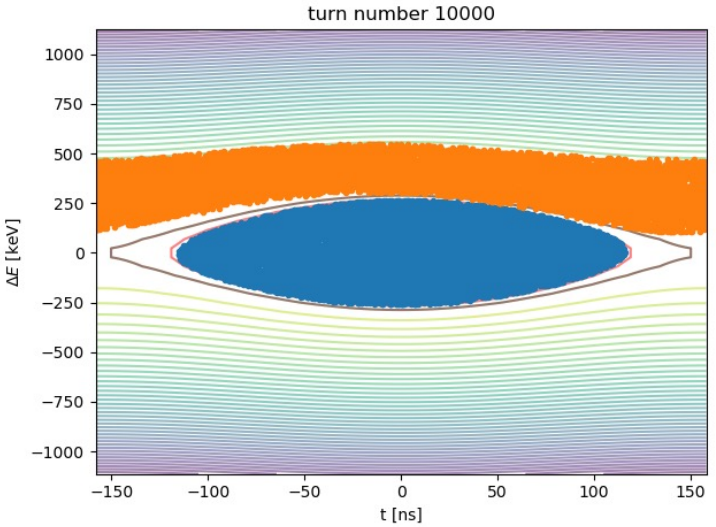


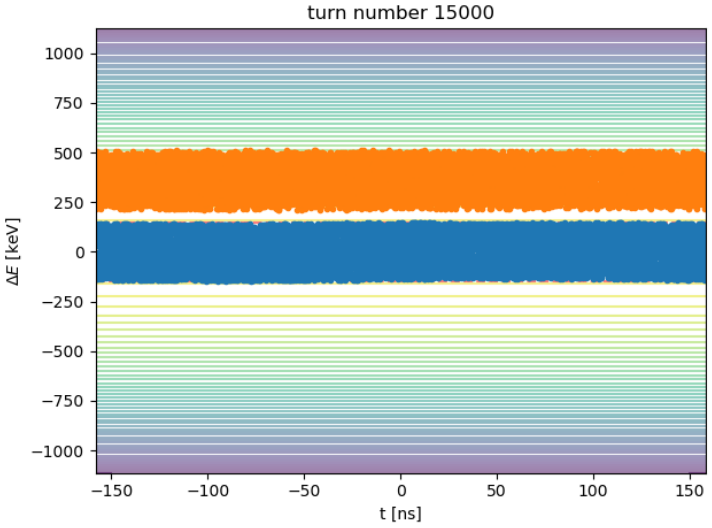
RF program for second beam
Final energy is 57.62 MeV

Stacking at bottom





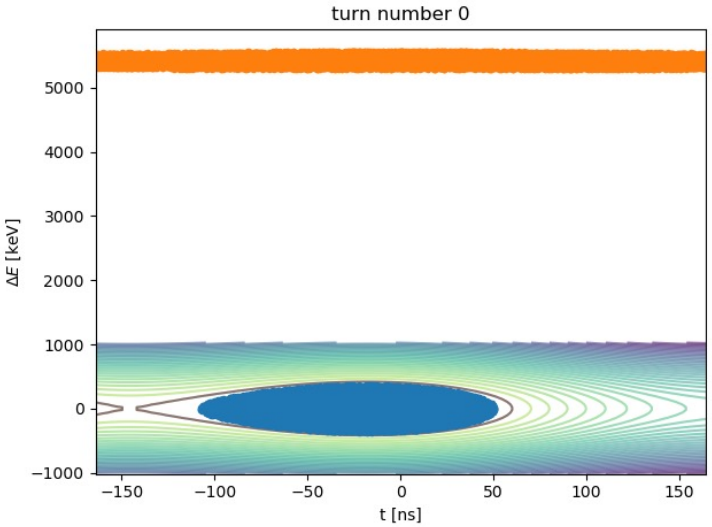


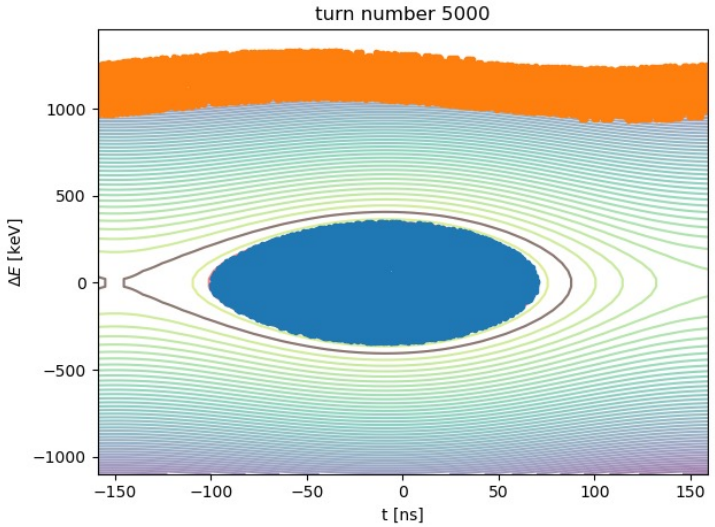


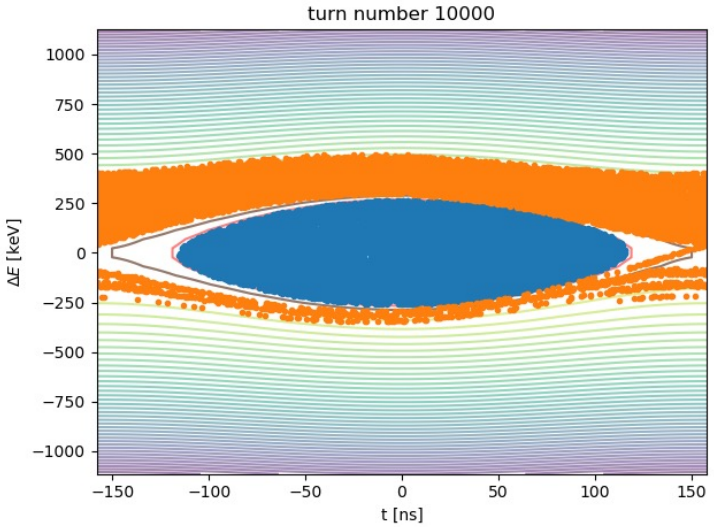
Final energy spread of coasting beam
Beam 1: 305 keV
Beam 2: 296 keV
gap: 58keV
Total spread: 659keV

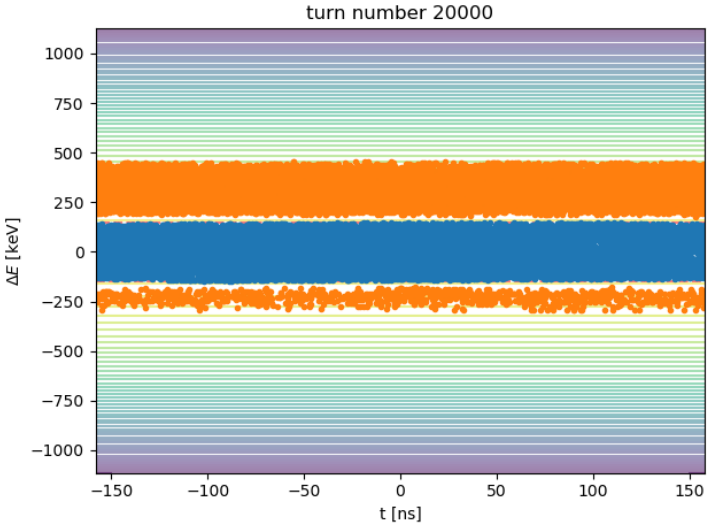
Emittance = energy spread * <ToF> = 0.2082 Vs

Stacking at bottom with smaller gap





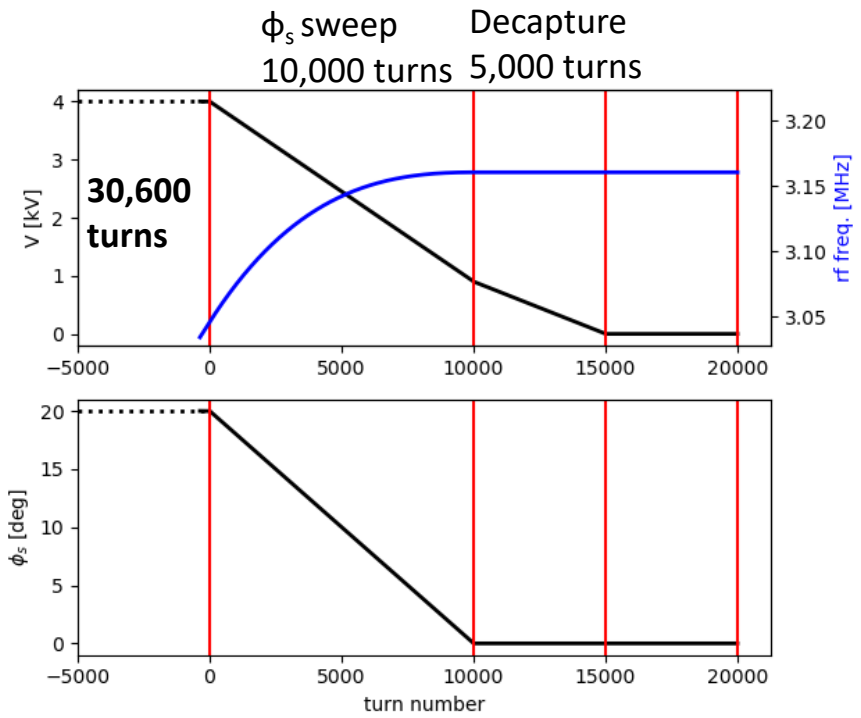




Final energy spread of coasting beam
Beam 1: 749 keV!
Beam 2: 295 keV
Total spread: 749 keV

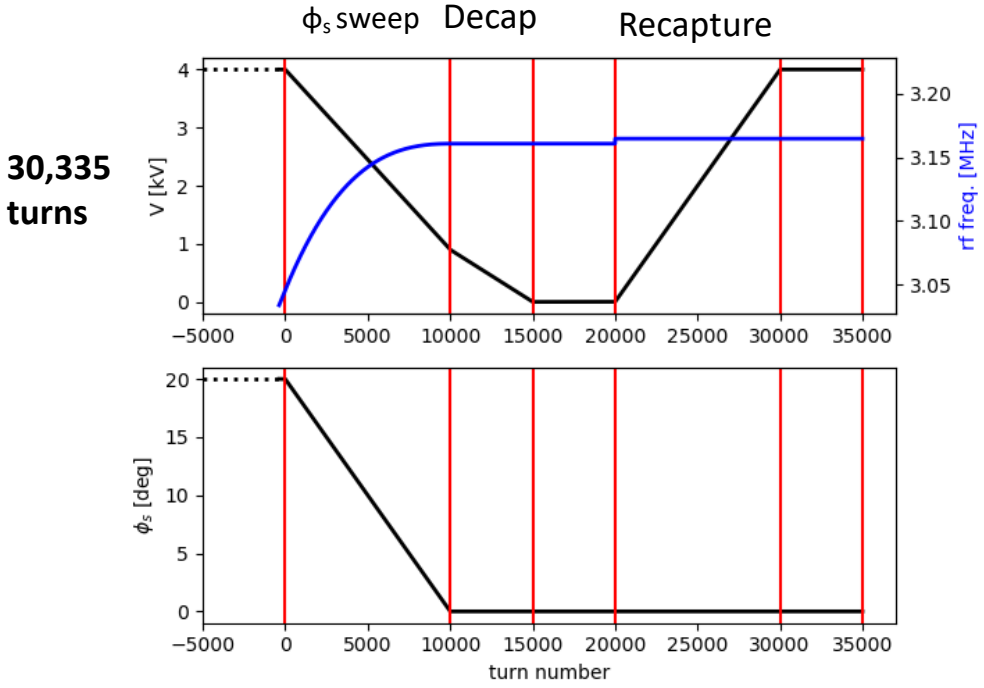
Second beam stacked at 57.68 MeV

Add recapture



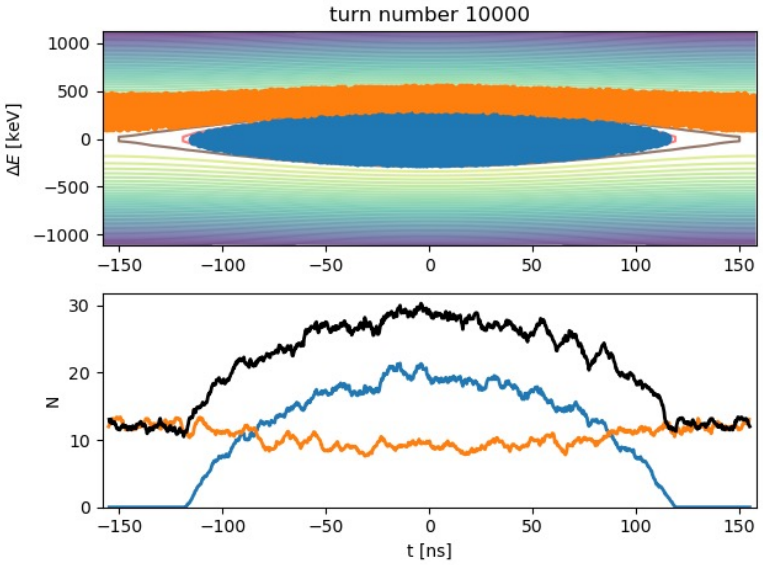
RF program for first beam
Final energy is 57.98 MeV

4.5kHz increase in RF frequency to adjust capture bucket

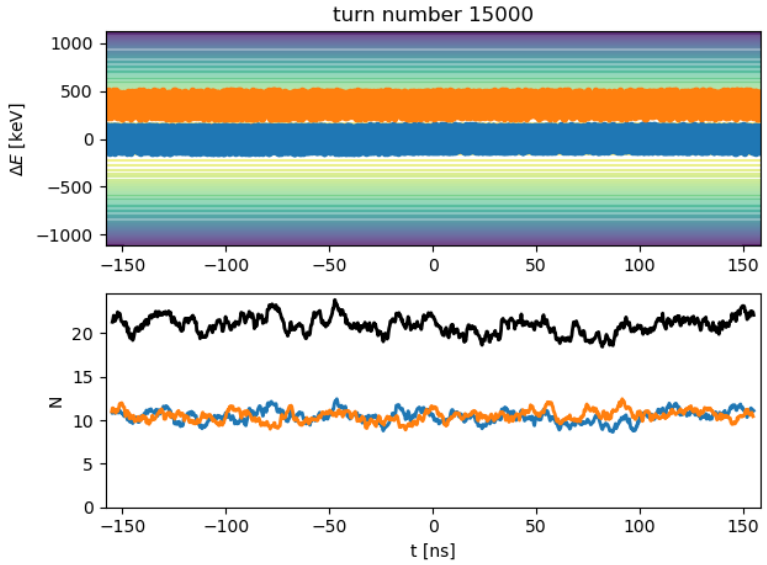


RF program for second beam
Final energy is 57.62 MeV
4kV, stationary bucket to capture two beams
Set capture frequency to mean of stacked beam revolution freq.

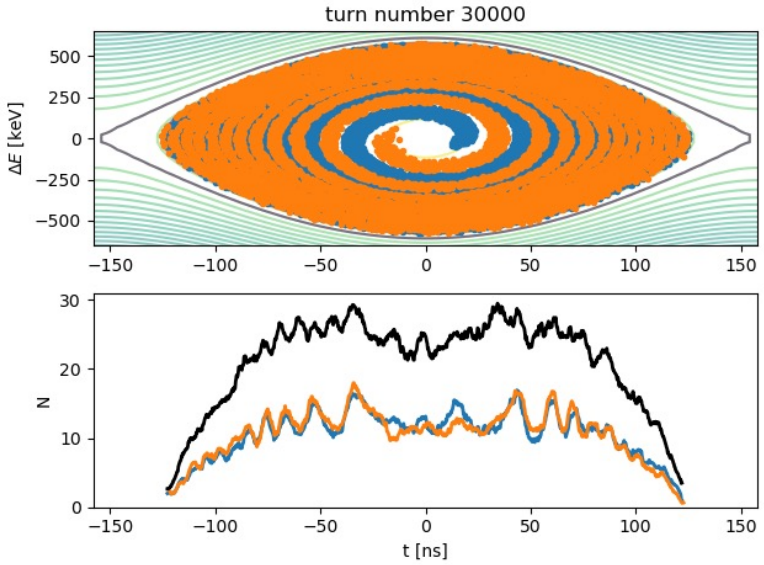
Recapture



After decapture



After recapture



- Emittance before & after capture: 0.208Vs & 0.212 Vs (2% increase)