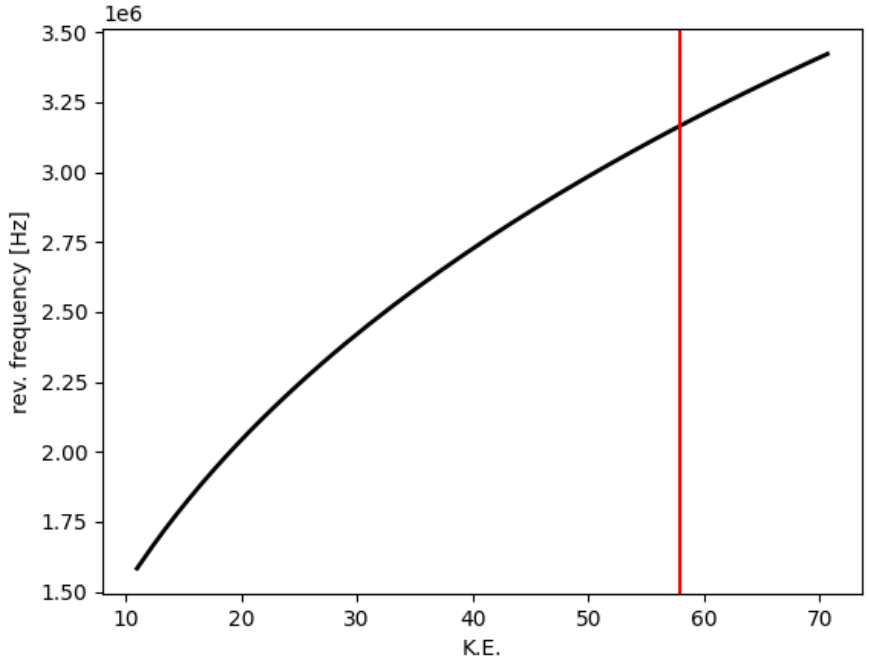
Adiabatic debunching at KURNS

D. Kelliher

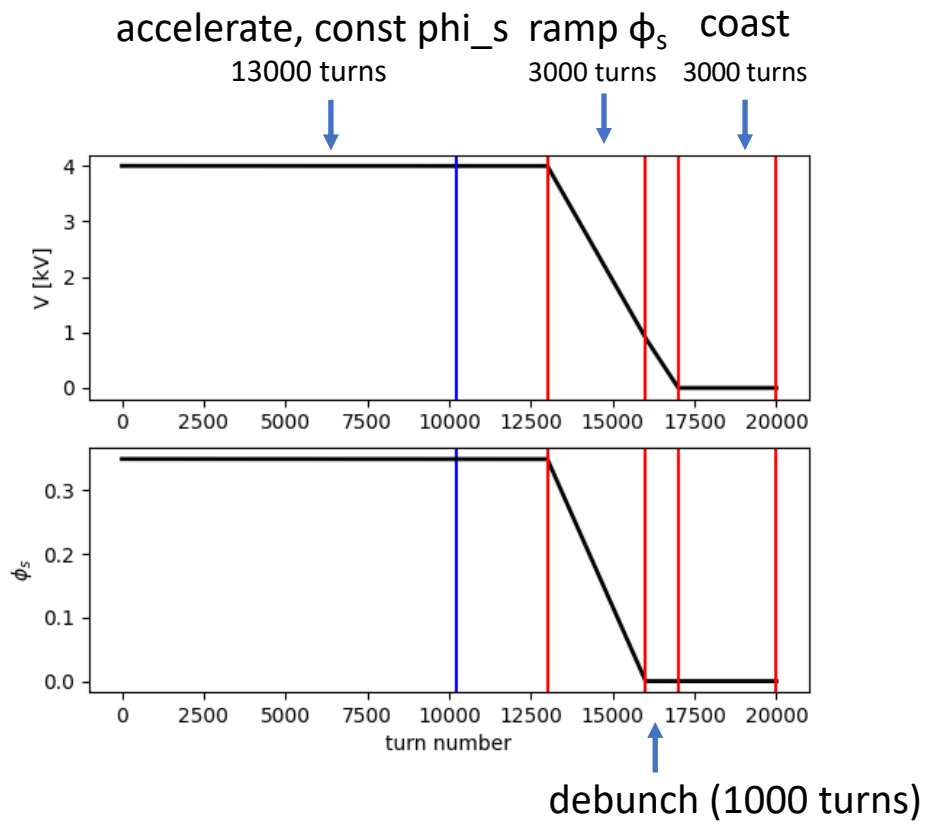
Stacking energy choice

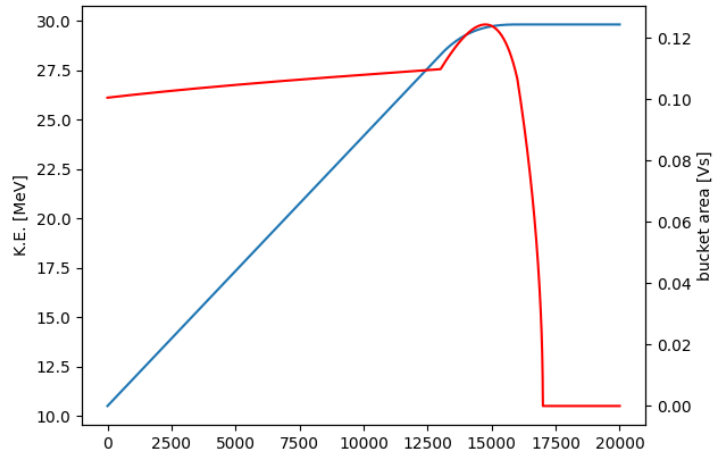


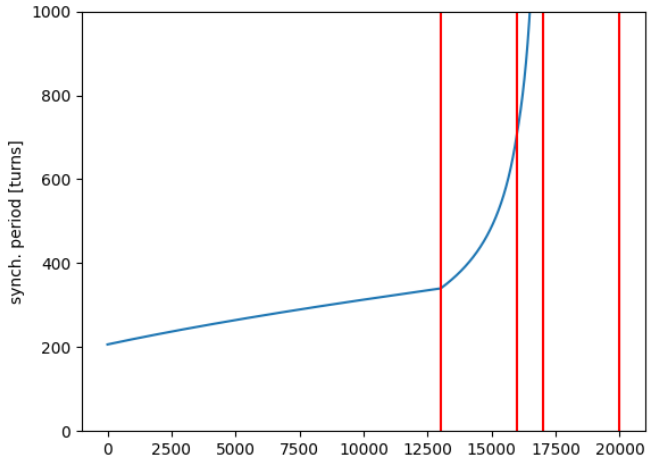
From Uesugi-san's table:

- rev. frequency at injection (11 MeV): 1.58 MHz
- rev. frequency doubles at 57.9 MeV
- Harmonic 2 RF would create at injection would create a harmonic 1 bucket at this energy.

RF program to stack at 30 MeV

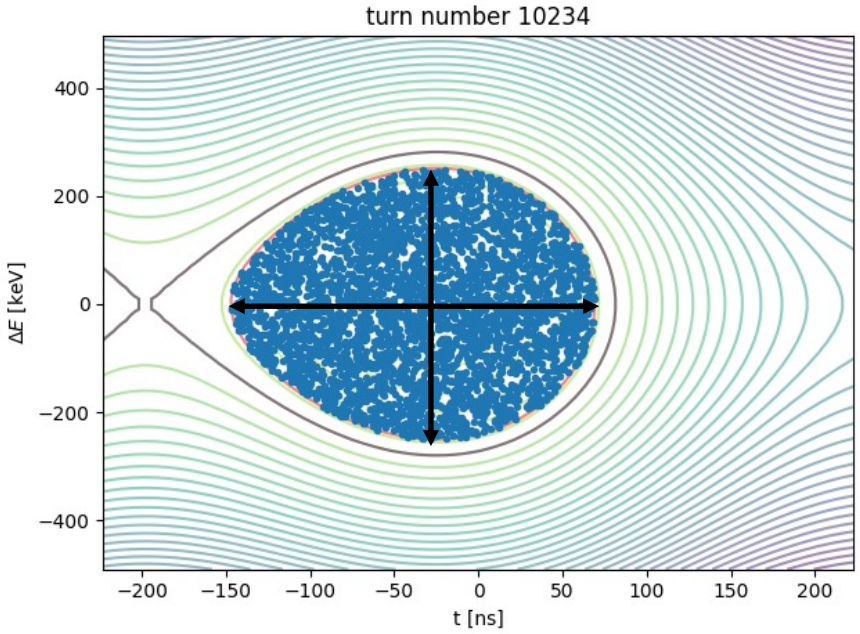




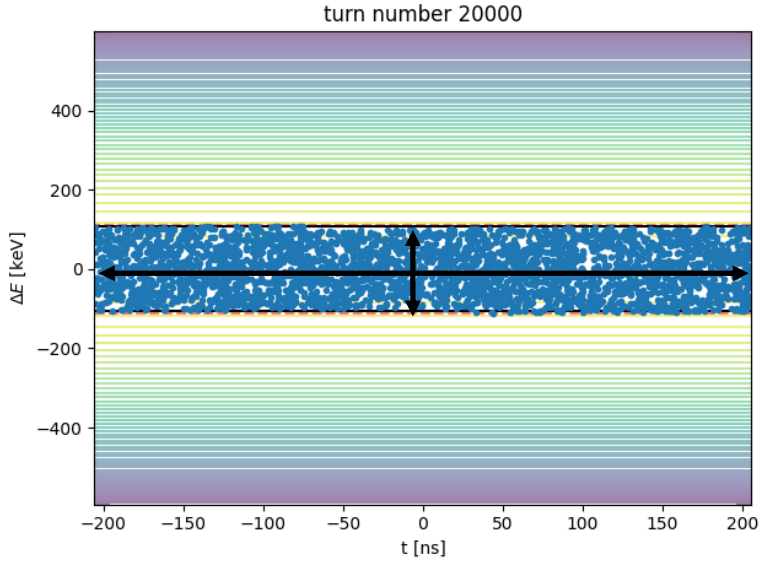


Voltage decreases linearly during debunching in this case.
- Try iso-adiabatic debunching!

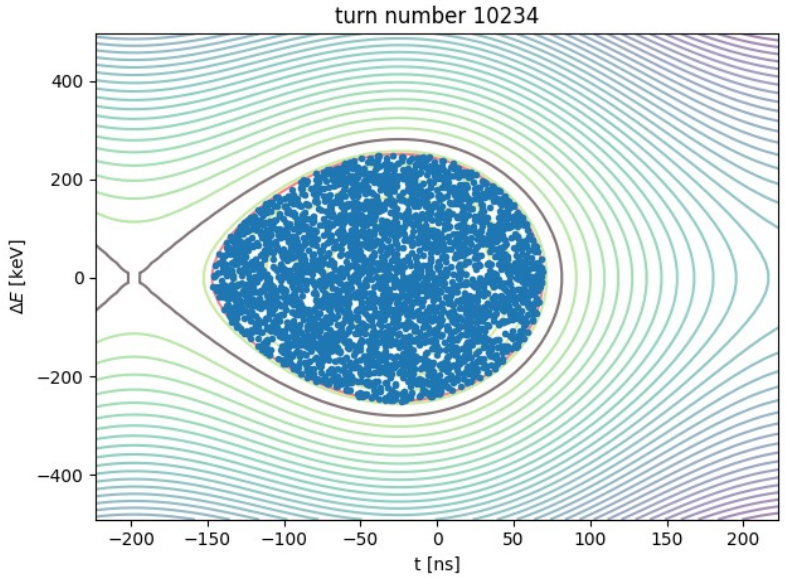
Calculating the emittance

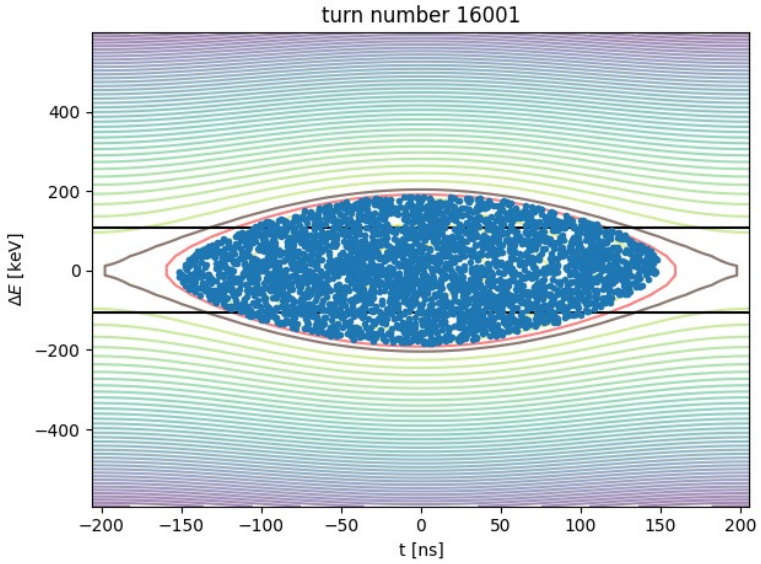


- Assume a uniform distribution within some Hamiltonian contour.
- The 100% emittance is given by the area enclosed by the contour.
- ΔEΔt is a factor 4/pi greater than the area of the enclosed elliptical contour.
- In the coasting beam case the contours are not closed. The 100% emittance is given by ΔEΔt.



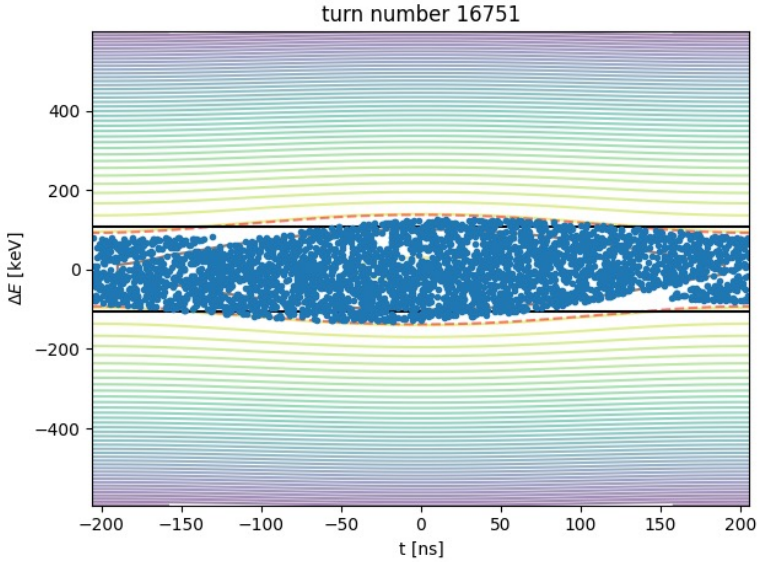
Accelerate and ramp down phi_s

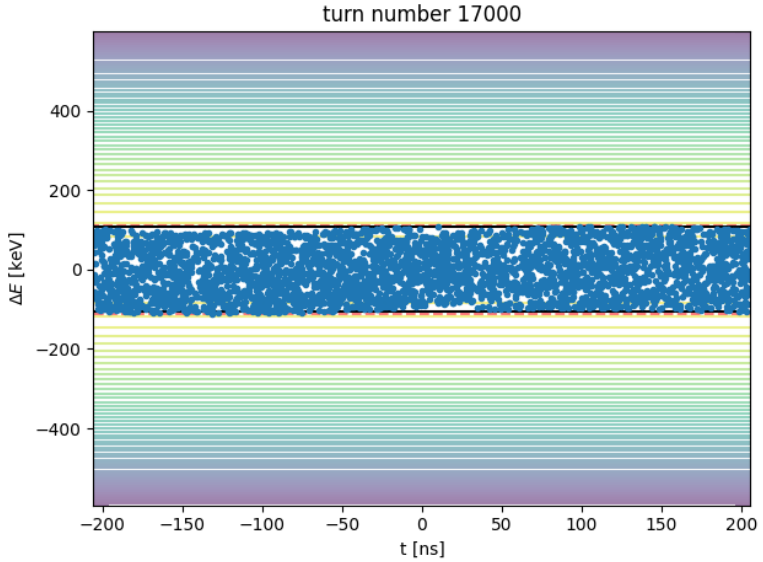


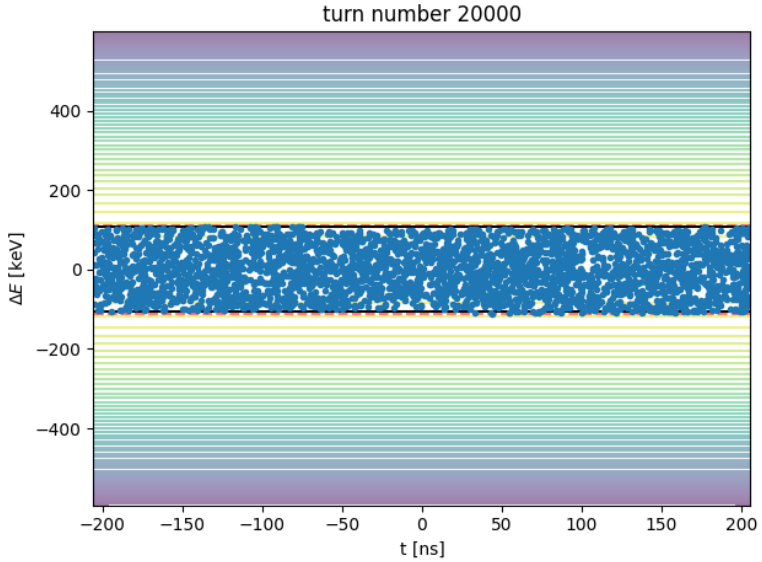


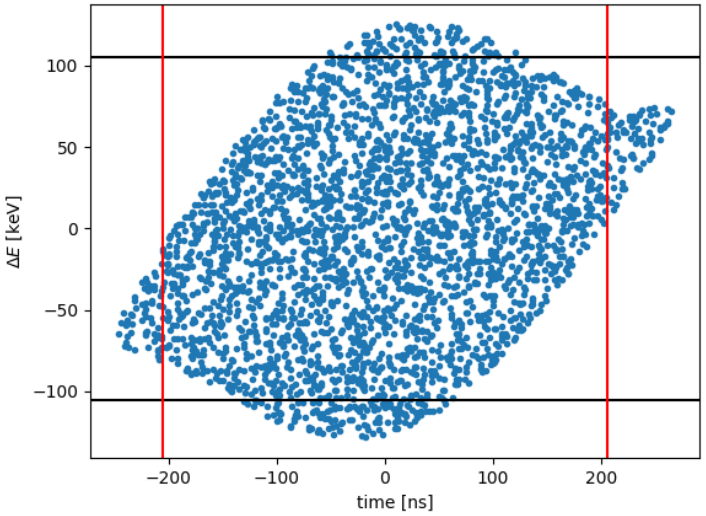
- Area in red contour defines the effective emittance
- This is conserved during ramp down of synchronous phase.

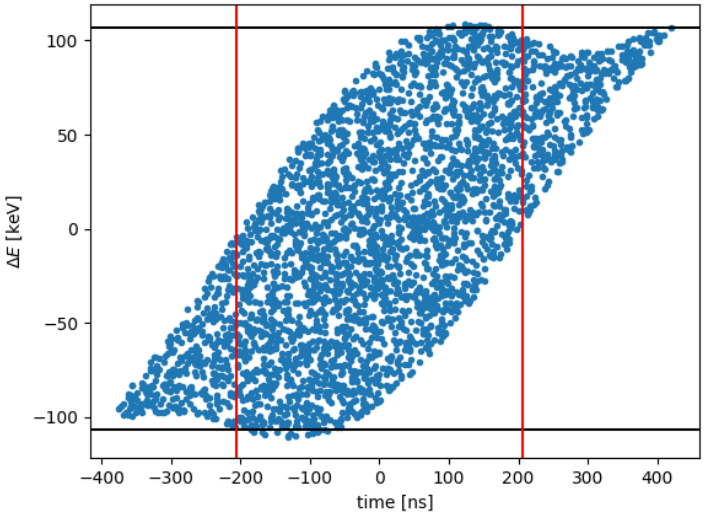
Debunching in 1000 turns

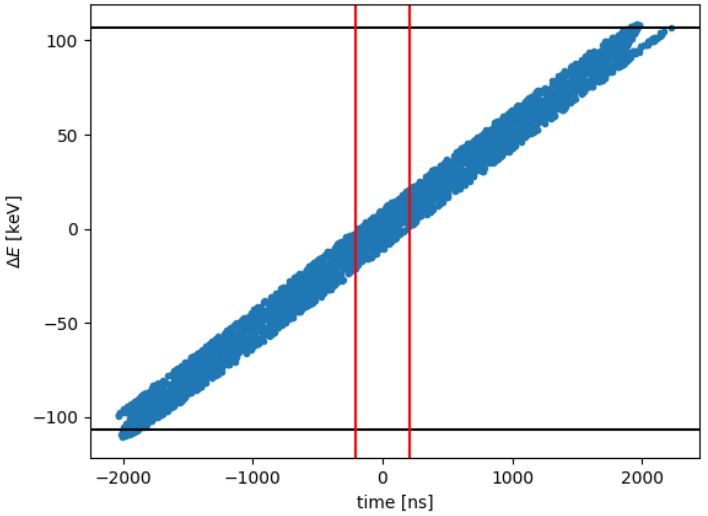






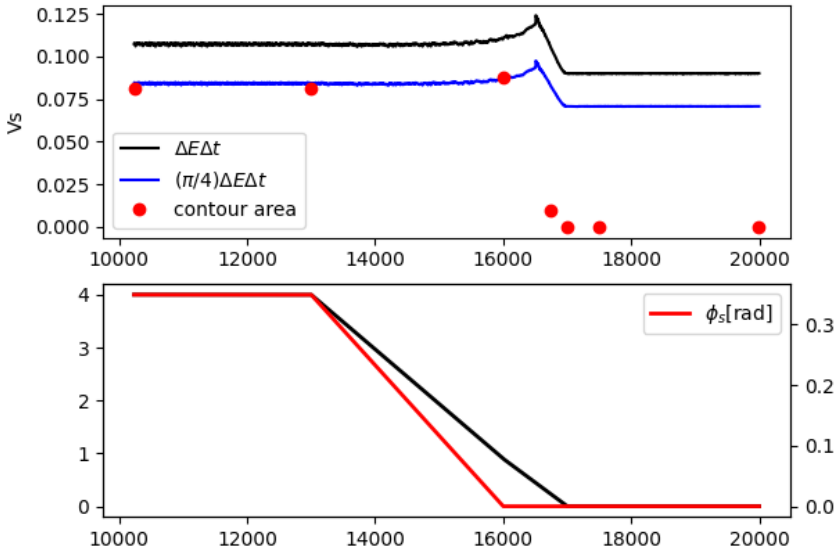






RF voltage reaches zero

Emittance evolution



Debunch over 1000 turns

$$\frac{4}{\pi}\frac{\text{final emittance}(\Delta E \Delta t)}{\text{initial emittance}(\Delta E \Delta t)} = 1.04$$