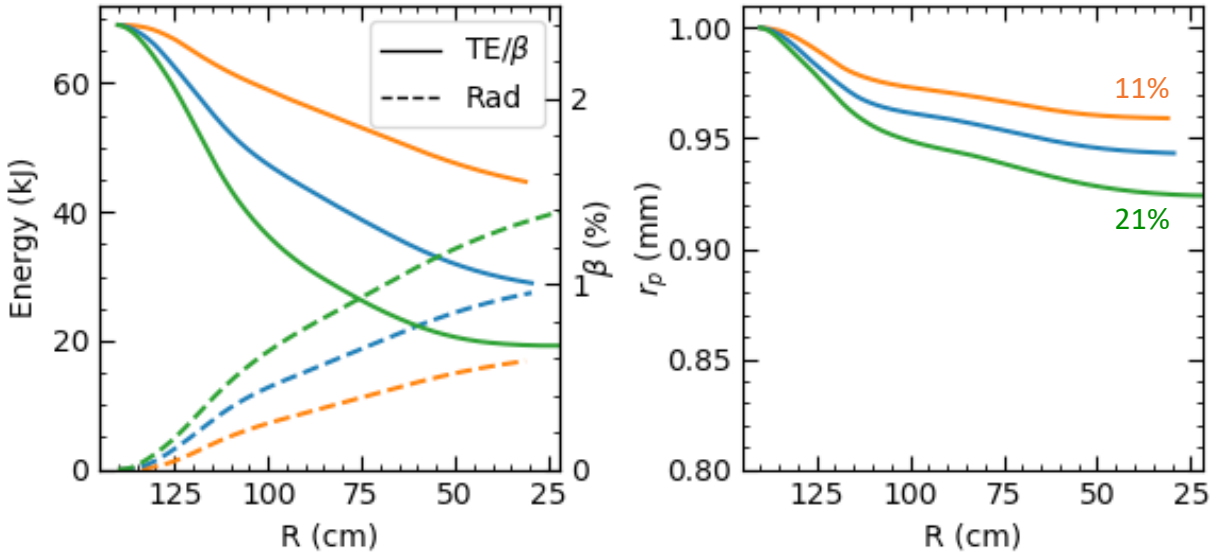
NSTX-U: 3D – Pellet injection studies

Radial injection. Different pellet velocities

- $r_p = 1$ **mm** (if entirely ablated, should be enough for a complete TQ and CQ)
- We ran a cases with pellet velocities of $v_p = 1000, 500$ and 300 m/s.

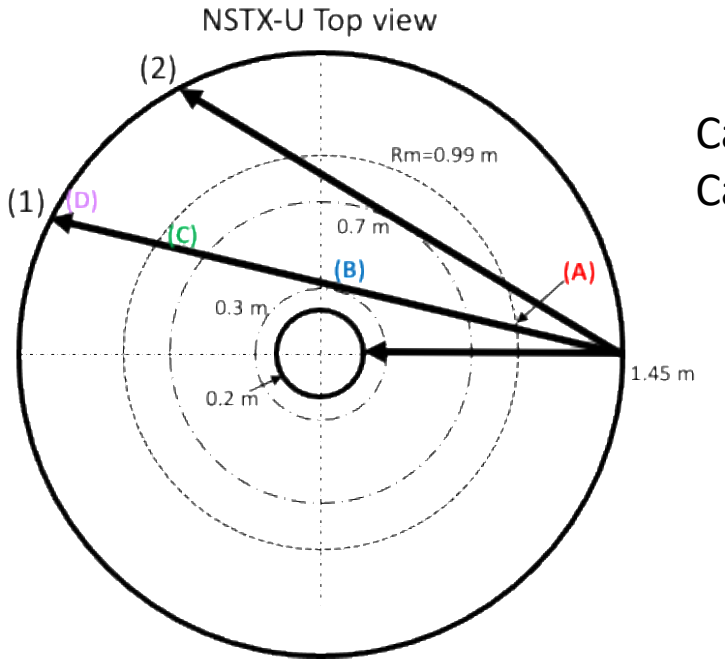


- **Thermal energy drop is sensitive to the pellet velocity, but**
- **Pellet is only partially ablated**
- **Even though it is not shown here, in all the cases the post-TQ temperature is above 100 eV**

NSTX-U: 3D C-pellet injection studies

We explored injecting bigger hollow pellets in a tangential direction, but with the same carbon content

- $v_p = 1000$ m/s -- $r_p = 3.6$ mm
- This also serves as a first step to:
  - **Case (1): Simulate an array of smaller pellets**.
  - **Case (2): Simulate a shell pellet** (for example, C dust coated with a solid carbon shell).

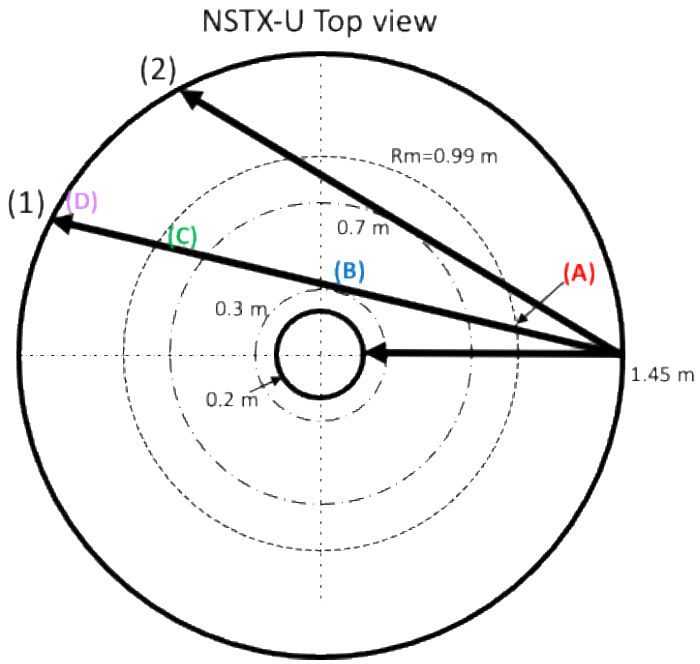


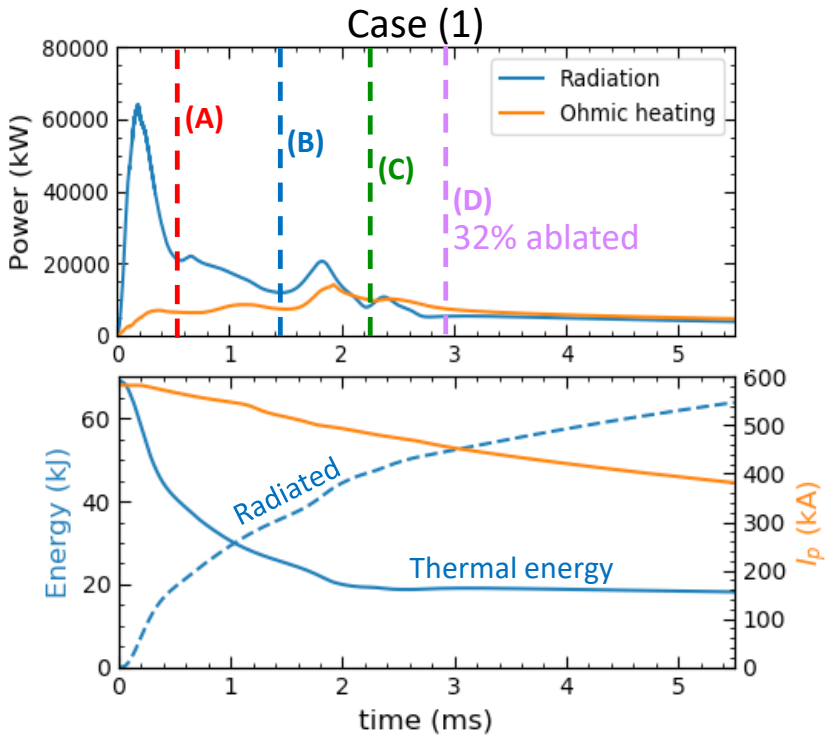
Case (1): Maximize path length
Case (2): Maximize toroidal core deposition?

NSTX-U: 3D C-pellet injection studies

We explored injecting bigger hollow pellets in a tangential direction, but with the same carbon content as in 1mm solid pellet

Case (1): A bigger pellet to simulate an array of small pellets



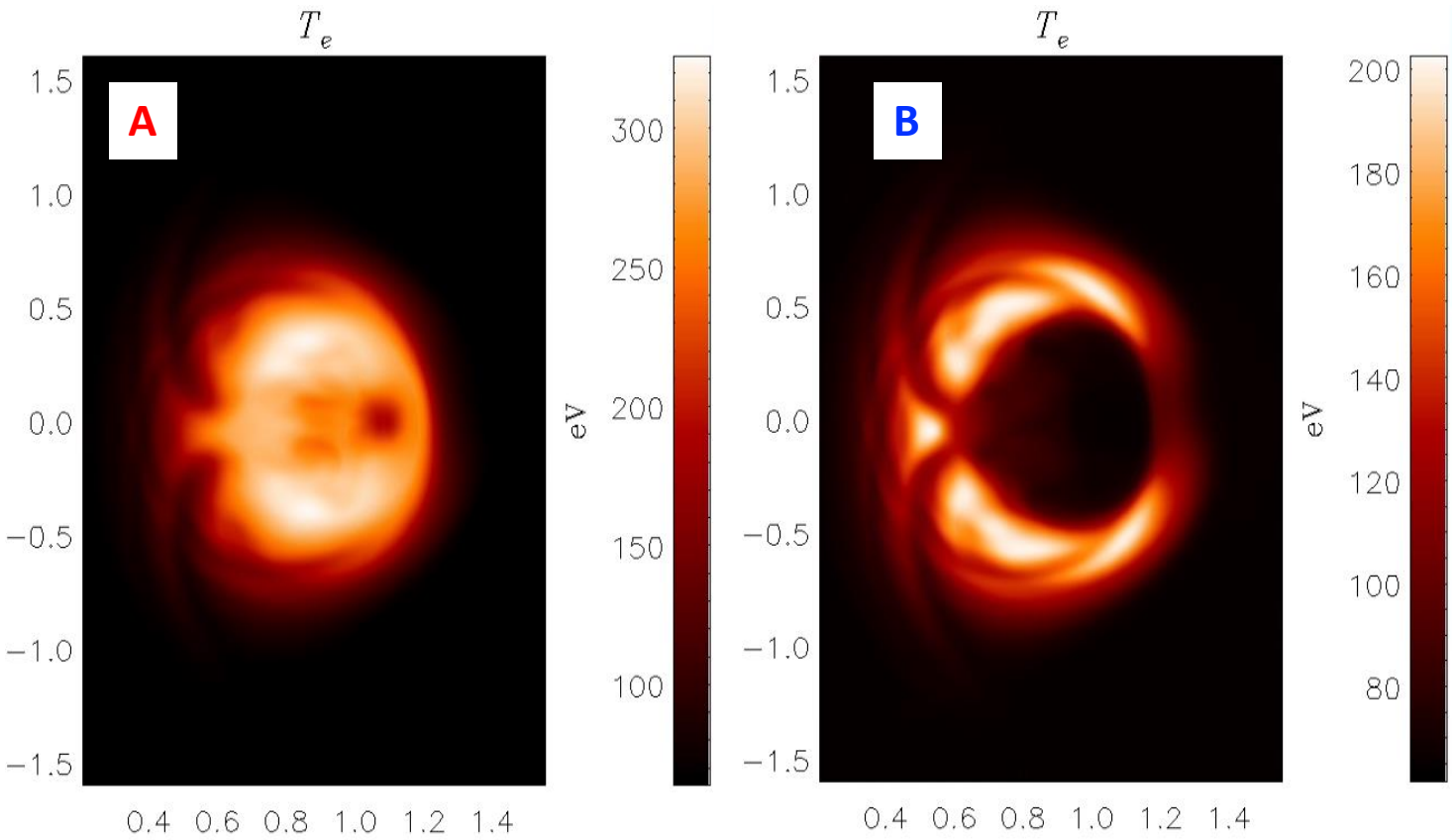


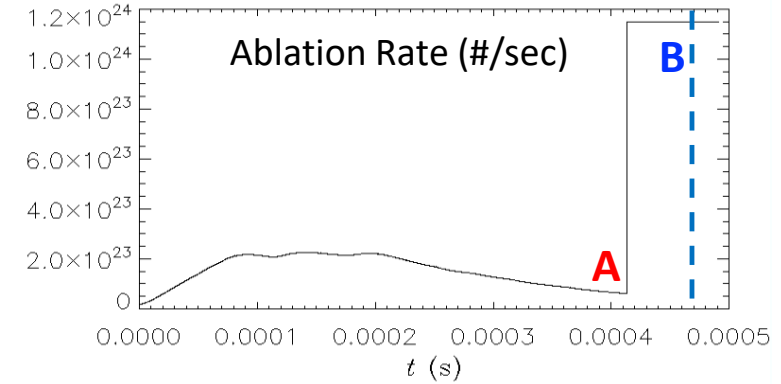
Ablation is still incomplete, but it starts to be significant to produce a current quench

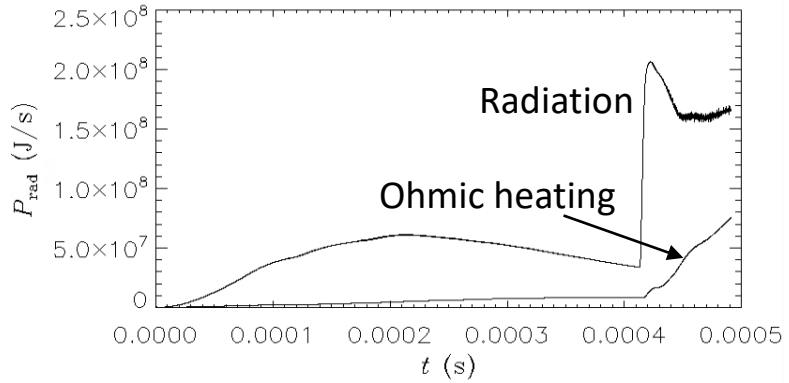
Update: Shell pellet (preliminary)

Case (2): Modelling a shell-pellet

- **We increased the ablation rate artificially once the pellet was at R=1.1m**
- **The ablation was calculated so when the pellet crosses the core (R=1.1 → ~0.8 m) it deposits 4x10^{20} C atoms (this value was estimated in 2D simulations to be enough for a complete TQ and CQ)**







Offset = 64 eV