Runaway Electrons in Fusion Plasmas by Tünde Fulöp

- **Motivation**: runaway electrons cause disruptions, affecting the safety of tokamaks
- Many runaway sources, but one of largest causes is from an **avalanche** effect
  - Existing runaways cause slower electrons to speed up past the runaway threshold
- **DREAM** (Disruption Runaway Electron Analysis Model) is used to model runaways in differing conditions
- **Methods of mitigating** runaways are material injection and magnetic perturbations
- Different machines require different methods of mitigation (**results are not optimistic**)
  - ITER: two-stage pellet injection
  - BurST: material injection
  - SPARC: passive 3D coils
- **Startup runaways** are also an issue and are modeled by STREAM
- **Benign termination** is a possible solution to disruptions once they are happening

Generation mechanisms

- ➢ Dreicer seed
- ➢ Tritium seed
- ➢ Compton seed
- ➢ Hot tail seed
- ➢ Avalanche

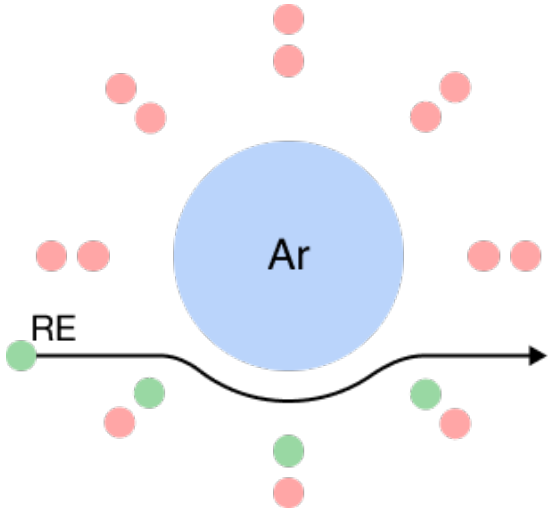

Fig: Avalanche