APS talk Outline: "Fast wave heating and edge power losses in NSTX and NSTX-U" (N. Bertelli et al.)

- Background and motivations: understand the physics behind the RF edge losses in NSTX (3 slides)
  - HHFW power losses in the SOL and RF spiral
  - Current status of HHFW modeling: AORSA + SOL but NO damping mechanism
- AORSA code: brief code description (1 slide)
  - wave equation and Fourier decomposition
- SOL model and collisional damping (1 slide)
  - Density exponential decay and how/where collisional damping is added in AORSA as a proxy to represent the real damping processes
- Edge losses vs. antenna phase and edge density in comparison with NSTX experiment (shots # 130608, 130621) (7/8 slides)
  - SOL density profile used
  - Edge losses vs. different parameters (antenna phase, min edge density, slope, etc.) for shots # 130608, 130621: results consistent with experiment
  - Demonstrated that the RF heating efficiency in the simulations is related to the FW cut-off, as hypothesized for the experimental HHFW heating results obtained on NSTX
  - 3D AORSA simulations show that power flow tends to go parallel to B
  - RF fields vs. min density in front of the antenna and relation to edge losses (in 2D and 3D)

APS talk Outline: "Fast wave heating and edge power losses in NSTX and NSTX-U" (N. Bertelli et al.) (con't)

- NSTX-U results: 2 cases B = 0.76 and 1 T (4 slides)
  - From high harmonics regime to mid harmonic regime
  - Edge losses vs. edge density for different antenna phases
  - comparison with NSTX cases: NSTX-U simulations confirm the same behavior found in NSTX BUT higher B provides higher cut-off density, which should give us the possibility to better minimize the edge losses in the future NSTX-U experiment.
  - Power partitioning: (i) high fast ion absorption, (ii) strong T_e/T_i dependence, and (iii) higher antenna phase favorable for heating electrons

- ITER case: minority heating (1 slide)
  - Edge losses vs. different min density in front of the antenna

} ***(not sure yet)***

- Summary and Conclusions (1 slide)
  - collisional damping in the SOL in AORSA as a proxy
  - Evidence that the RF heating efficiency in the simulations is related to the FW cut-off and the edge losses are related to the wave propagation
  - Simulations results consistent with the experiment in terms of phase antenna and edge density dependences
  - 3D AORSA simulations show that power flow tends to go parallel to B
  - NSTX-U results: edge losses and absorbed power partitioning
  - optimization of the edge plasma density profile important for ICRF heating efficiency on ITER where the distance between wall and separatrix is large (~ 20 cm).