

# (TH/P3-14) Guttenfelder et al., Measurement and prediction of momentum transport in spherical tokamaks

- **Important to validate momentum transport theory for predictions of rotation profile in ITER, FNSF, ...**
- This paper presents validation of quasi-linear gyrokinetic predictions of momentum pinch over a wider range of beta and aspect ratio than previously examined, by using experiments from both NSTX and MAST spherical tokamaks
- Quasi-linear GYRO simulations predict very weak momentum pinch based on NSTX H-mode experiments
  - Pinch predictions are much weaker than NSTX experimental results (and weaker than both exp. & theory in conventional tokamaks)
  - The weak pinch is shown to be due to both electromagnetic effects and low aspect ratio strongly constraining symmetry characteristics of the unstable ballooning modes (Guttenfelder, Phys. Plasmas 2016)
  - A stronger inward pinch is predicted at lower beta with sufficient density gradient, which motivated running a similar MAST L-mode experiment (i.e., at lower beta)
- The predicted pinch in the MAST L-mode is also weakly inward and falls within the range of the experimentally inferred pinch
  - However, there is too much uncertainty in the measurements (due to issues with non-stationarity) to quantitatively constrain the theory predictions
- Planned NSTX-U experiments will continue this validation effort at low aspect ratio