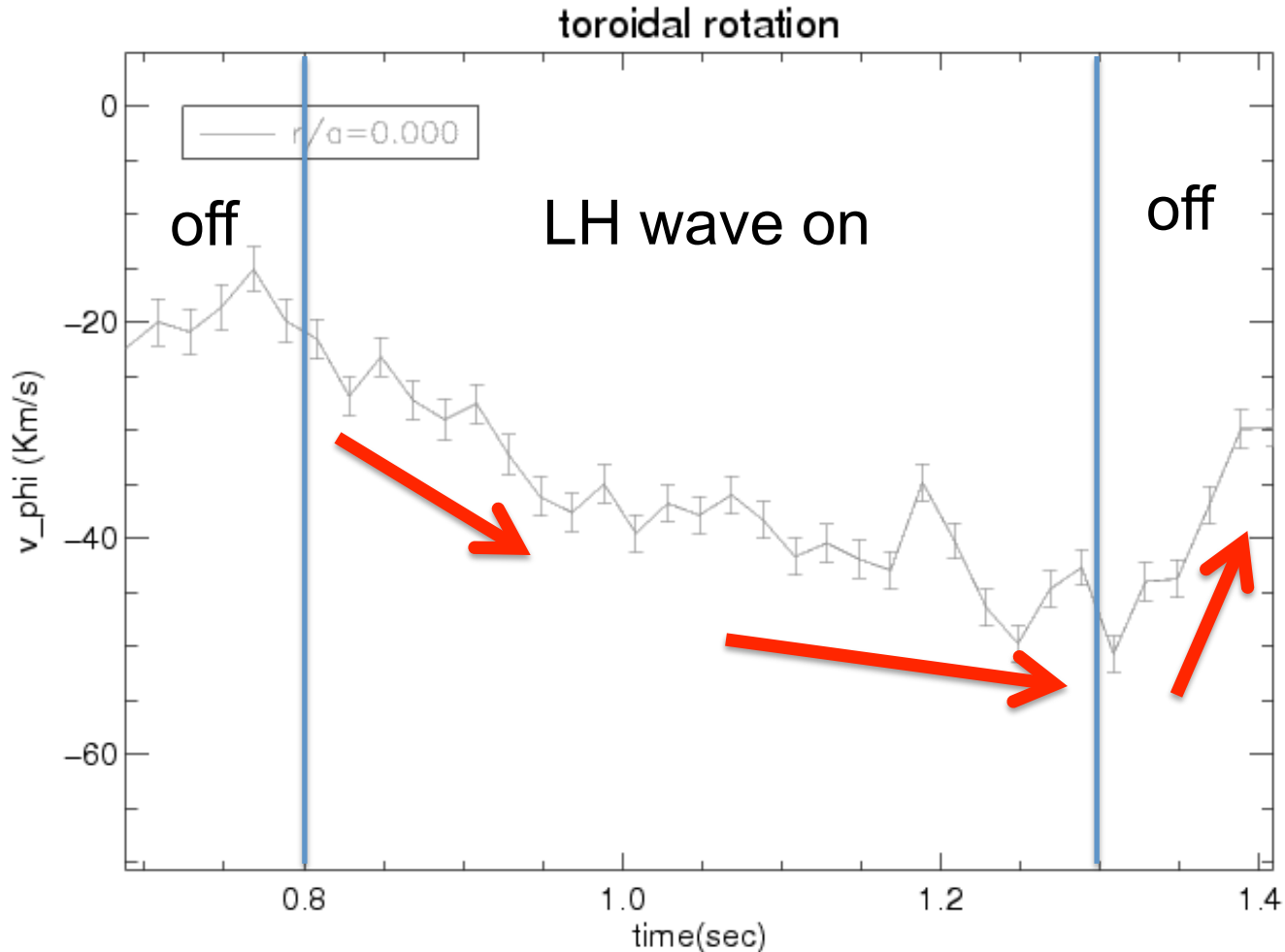


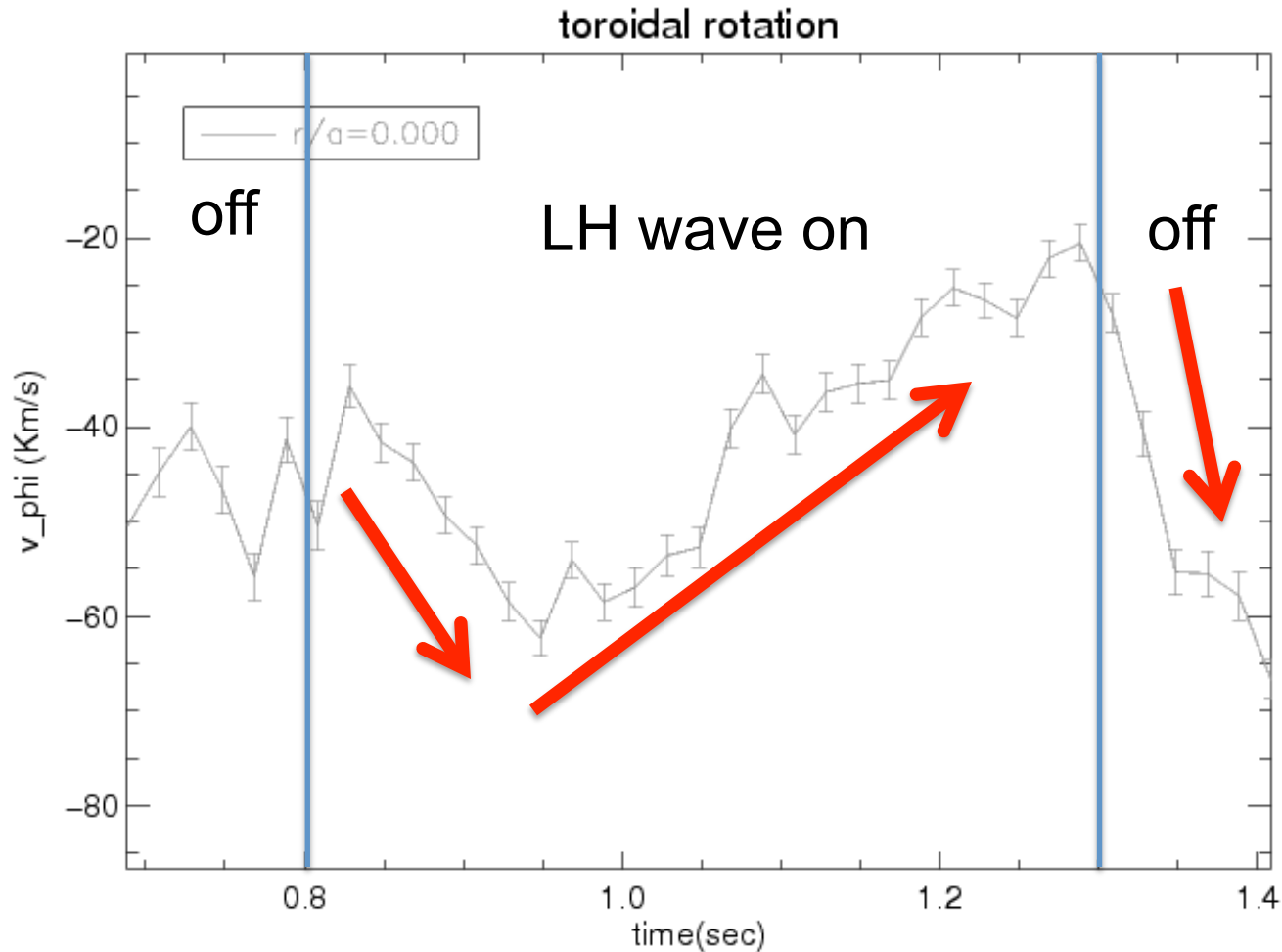
C-Mod Experiment Results

- High plasma current case ($I_p=700\text{KA}$): $\Delta V_{tor} < 0$

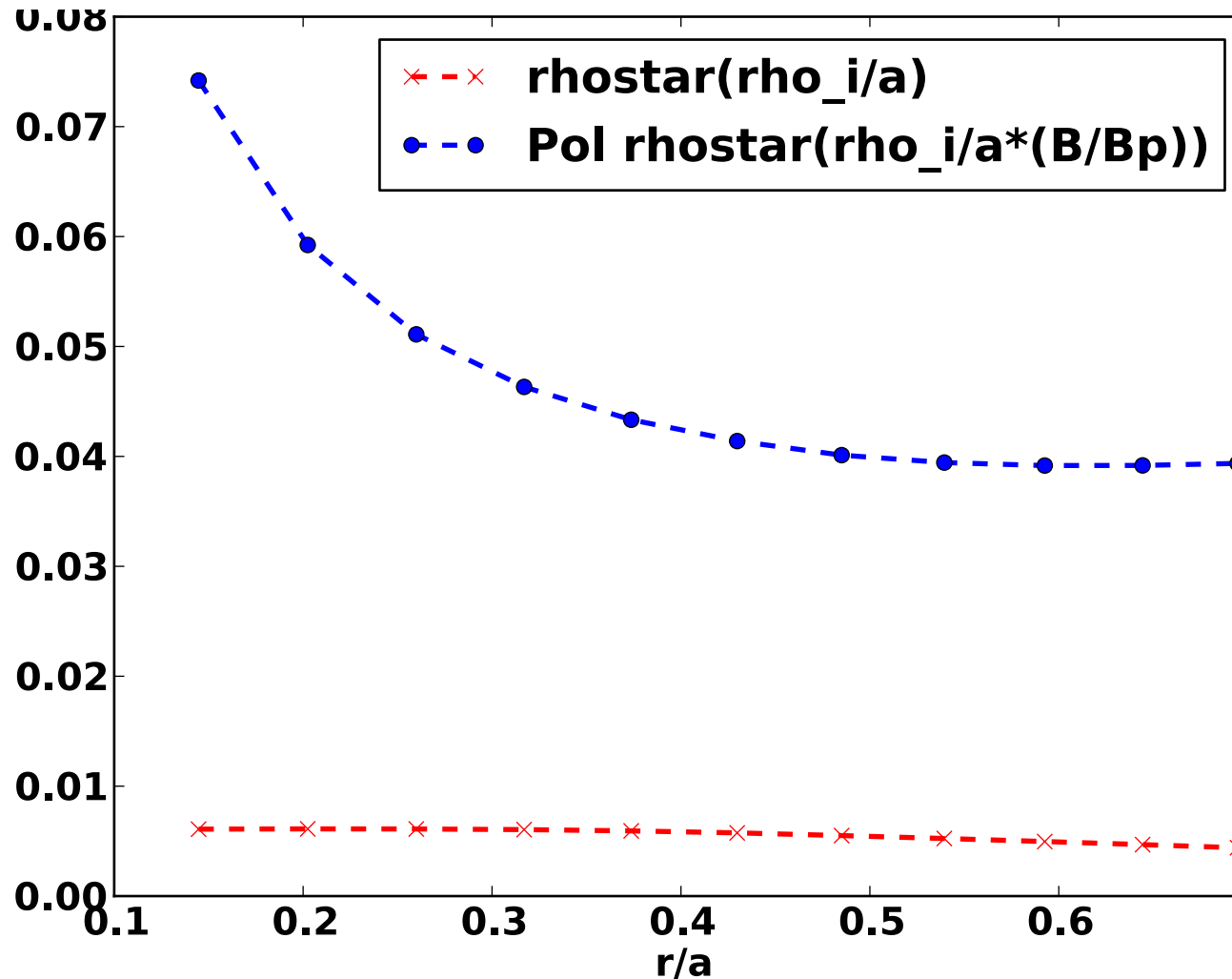


C-Mod Experiment Results

- Low plasma current case ($I_p=350\text{kA}$): $\Delta V_{tor} > 0$

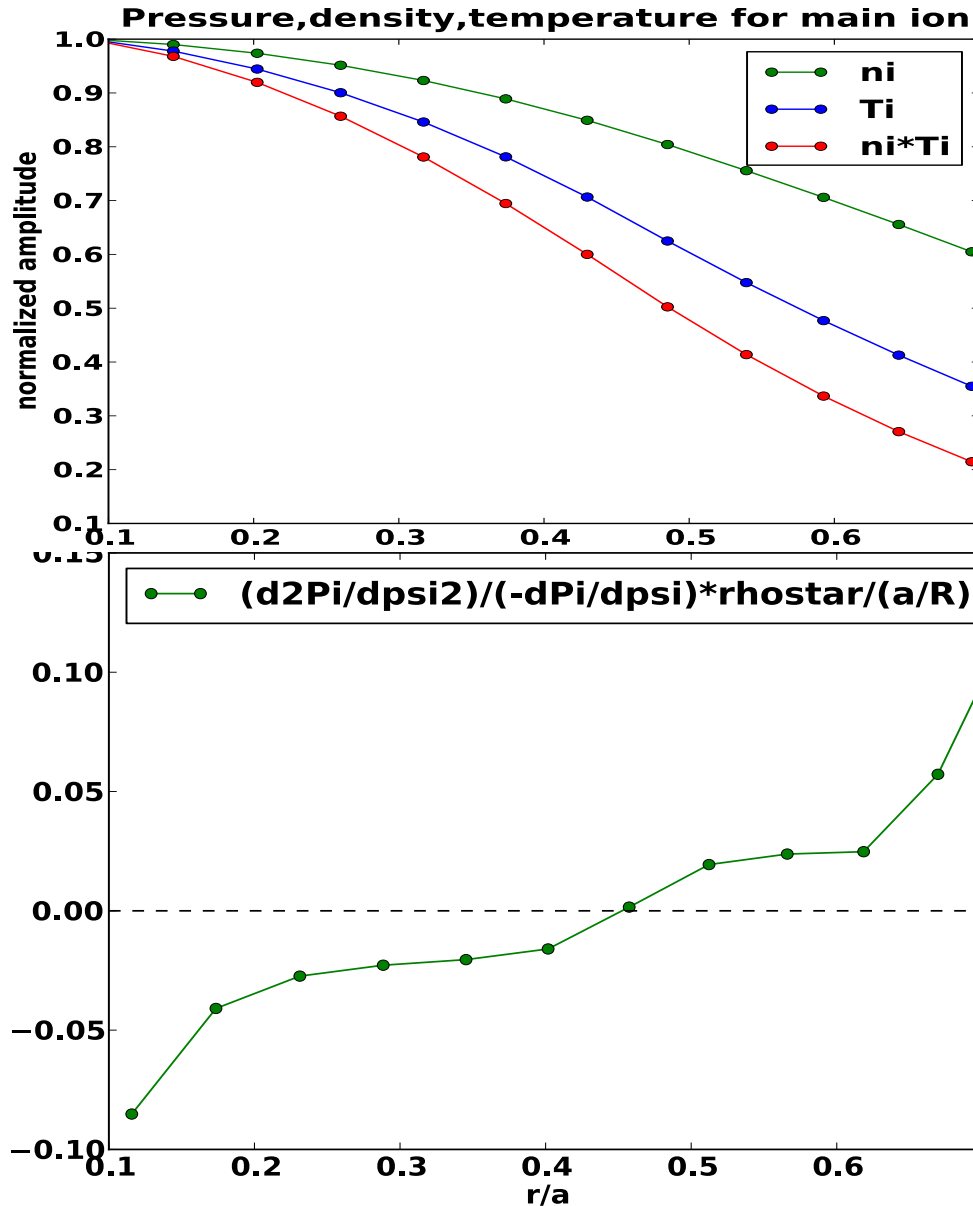


Rhostar vs. Poloidal Rhostar in C-Mod



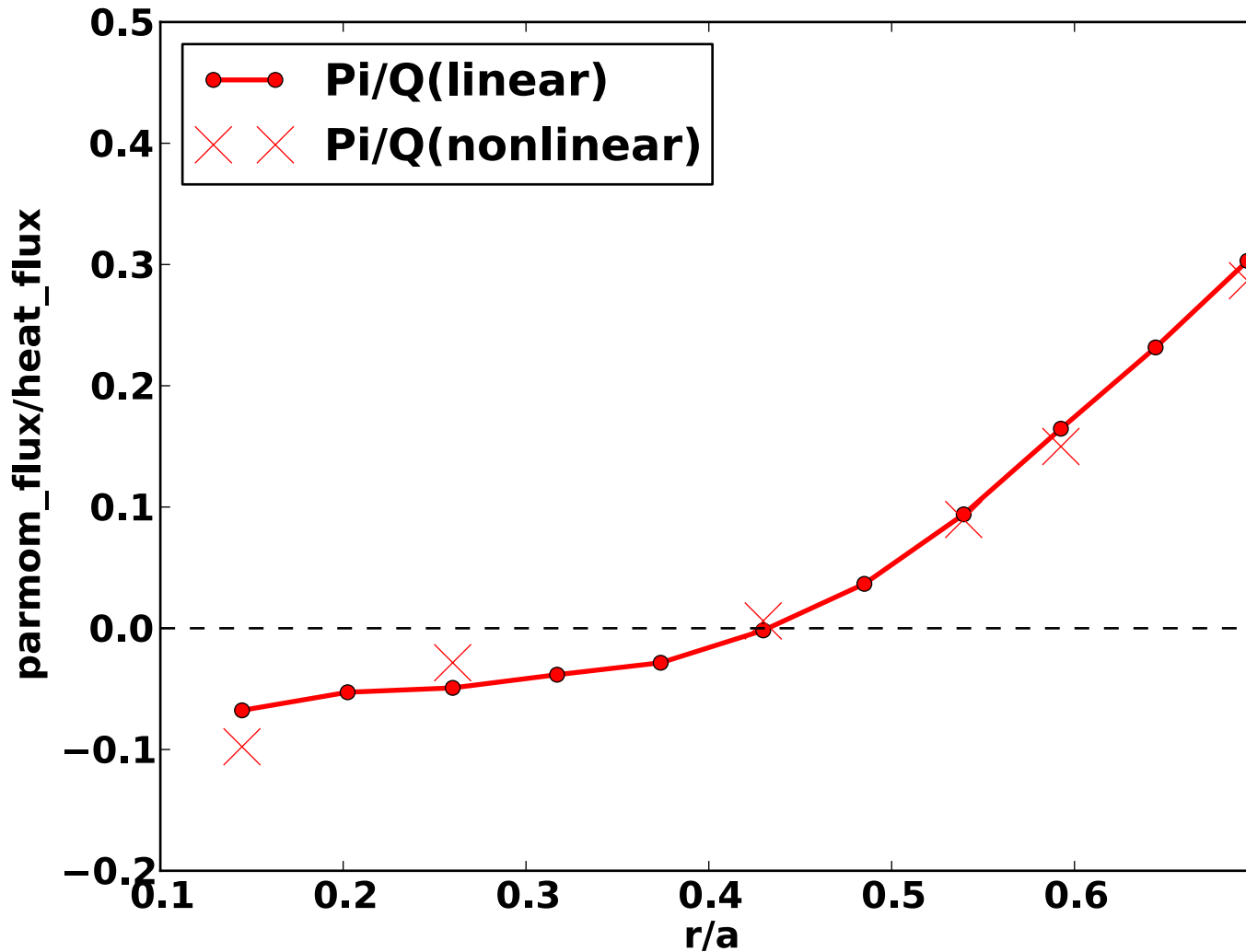
- C-mod Lmode is in the low flow regime

Second derivative of pressure profiles

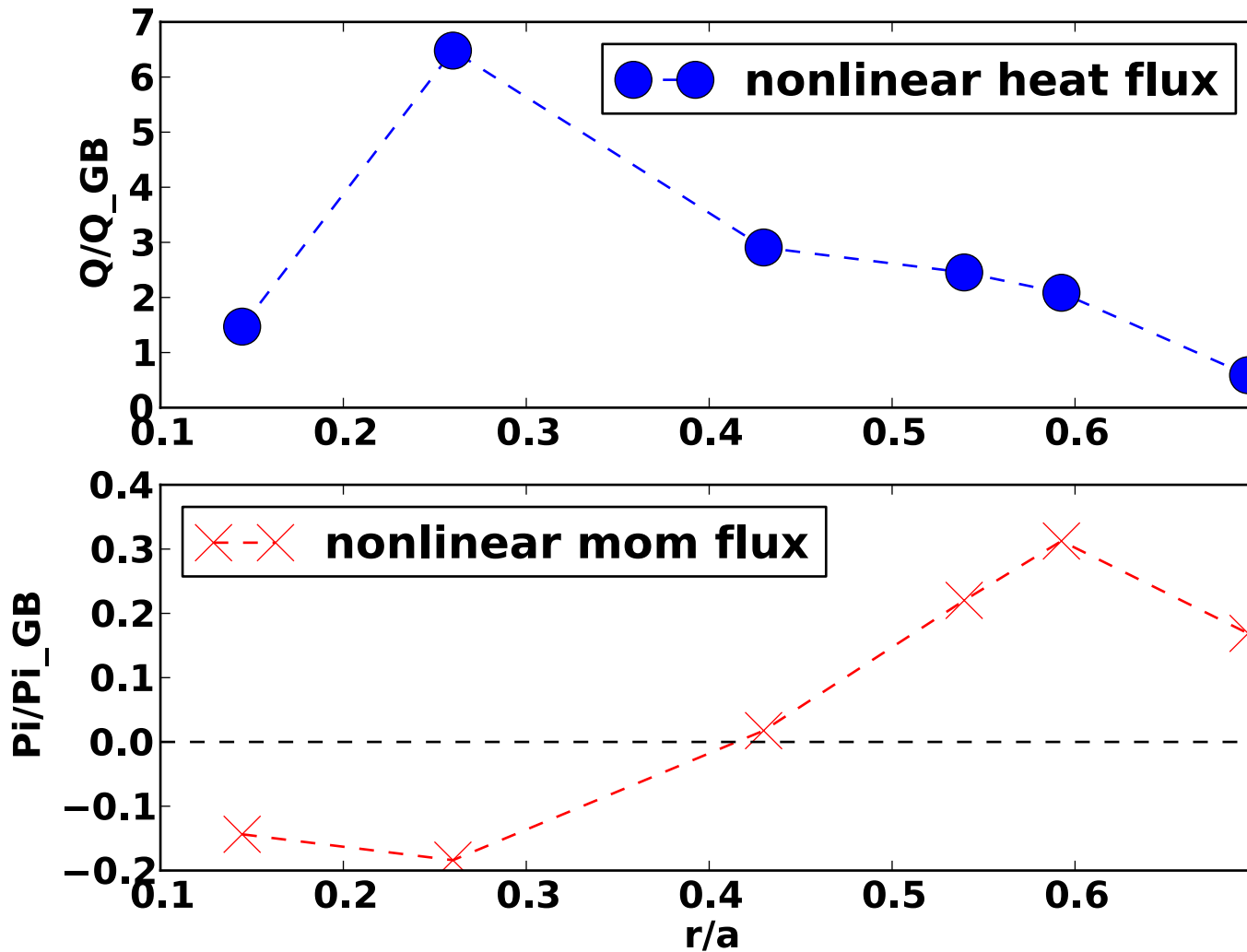


- L-Mode plasma
- One of the low flow correction terms is from the second order derivative of ion pressure in psi

GS2 results for the ratio of mom. flux to heat flux



- w/o coriolis term and velocity shear term
- Pi/Q ~ poloidal rhostar
- For Pi/Q, Quasilinear agrees with Nonlinear?

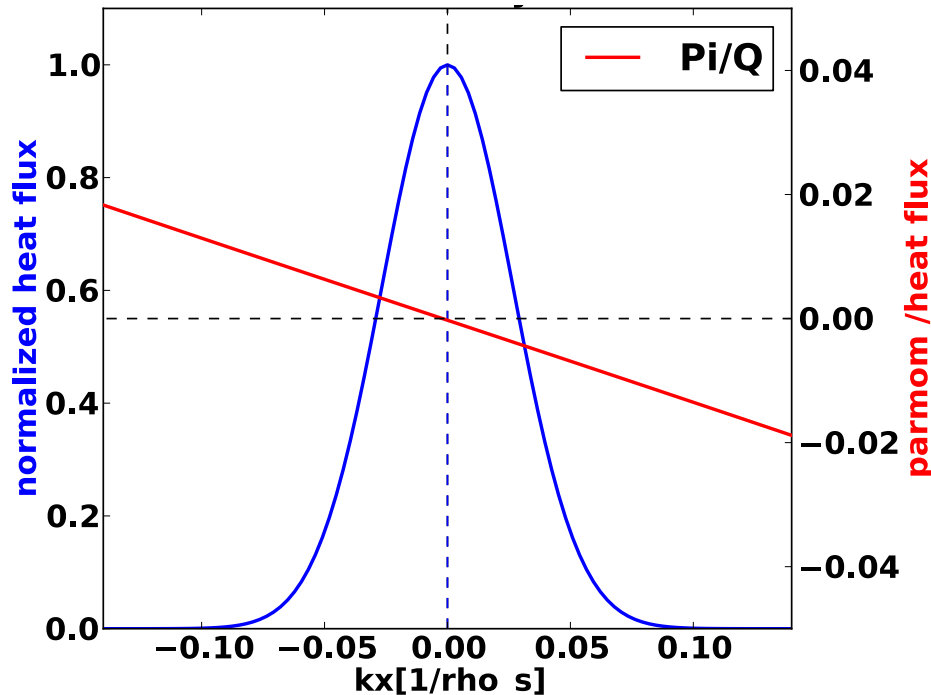


- ITG dominant
- Q^* surface \sim constant (Ohmic)
- Magnetic shear increasing in radius

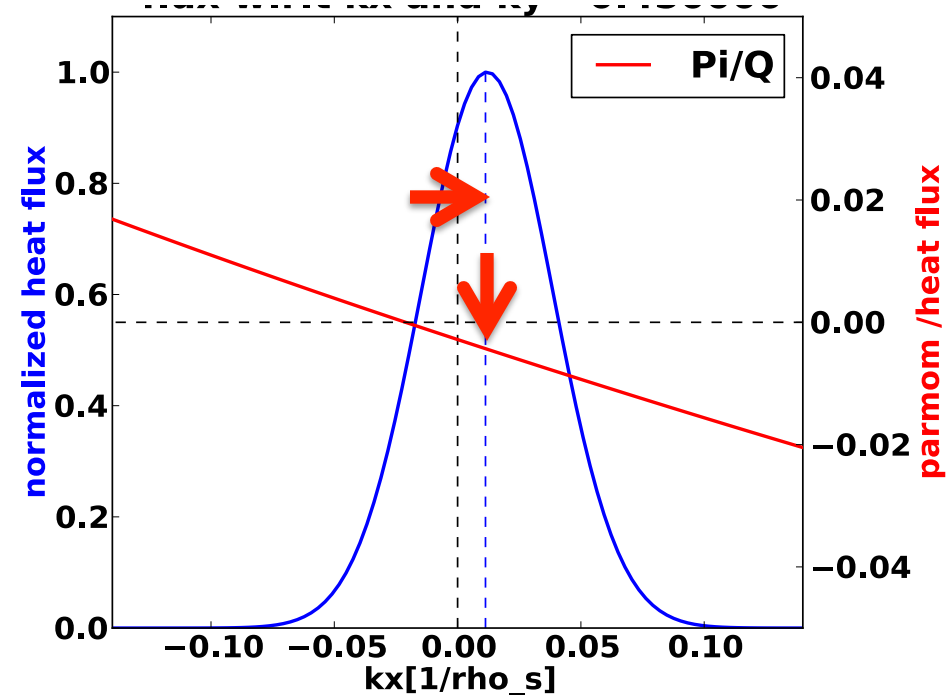
Symmetry breaking of Pi/Q in kx

- Shift of the Pi/Q line in kx determines Mom. Flux
- What determines the slope and the shift of Pi/Q?
- Linear GS2 results(Cyclone case with an artificial $d^2P/d\psi^2 < 0$)

<w/o lowflow correction>

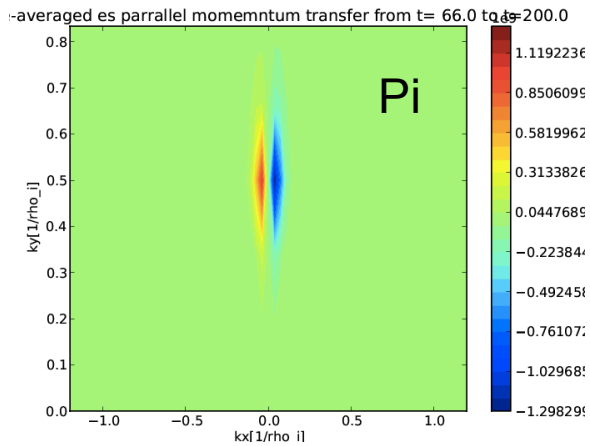


<w/ lowflow correction>

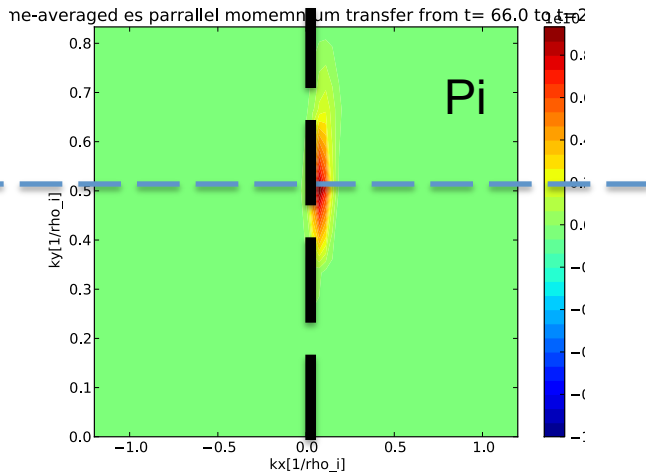


Linear GS2 result

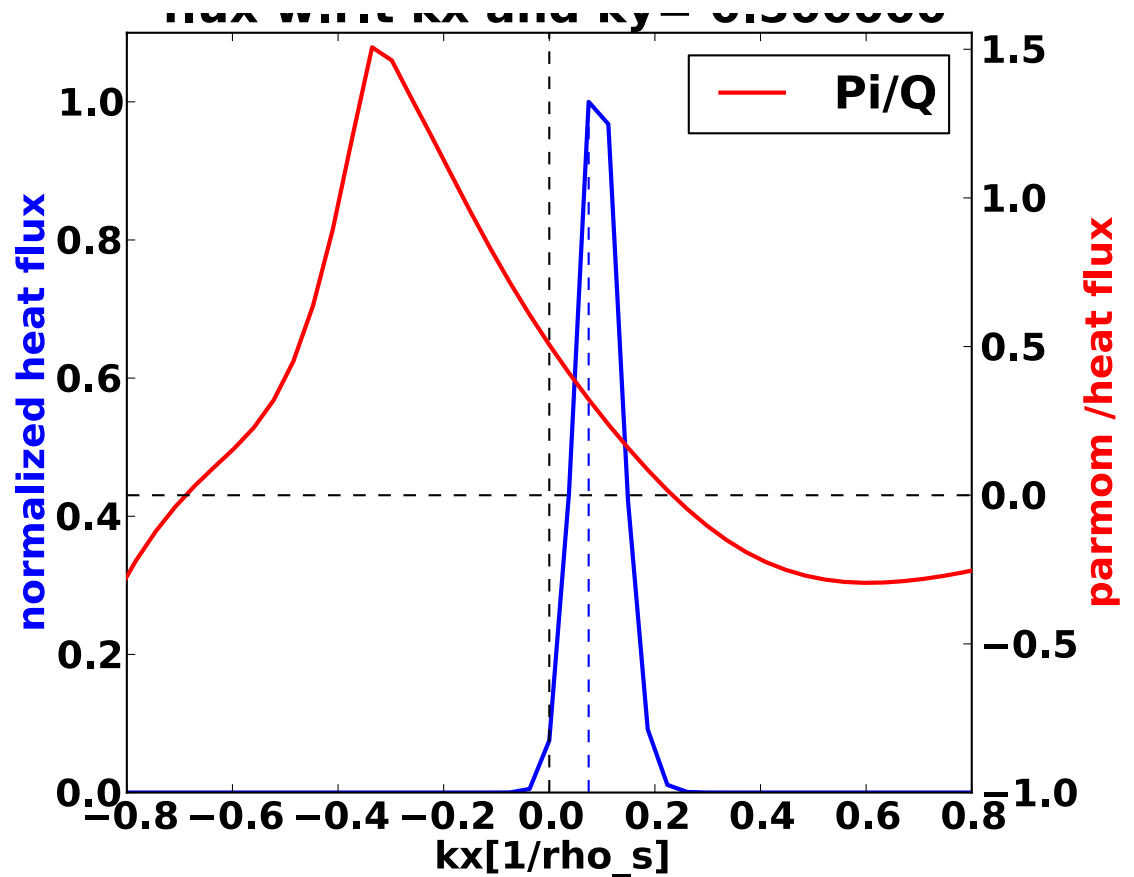
- w/o lowflow



- w/ lowflow

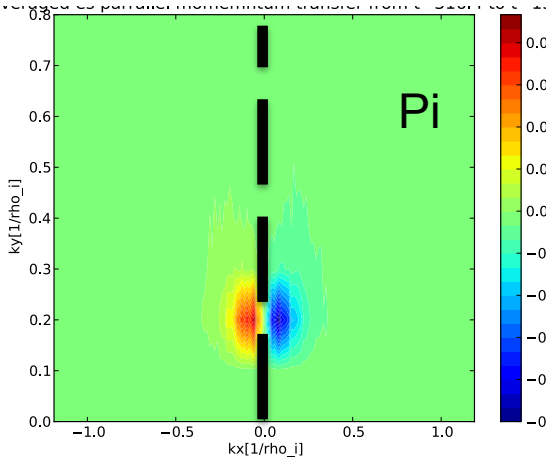


- Q(left) and Pi/Q(right) w/ lowflow for a peak $ky=0.5$

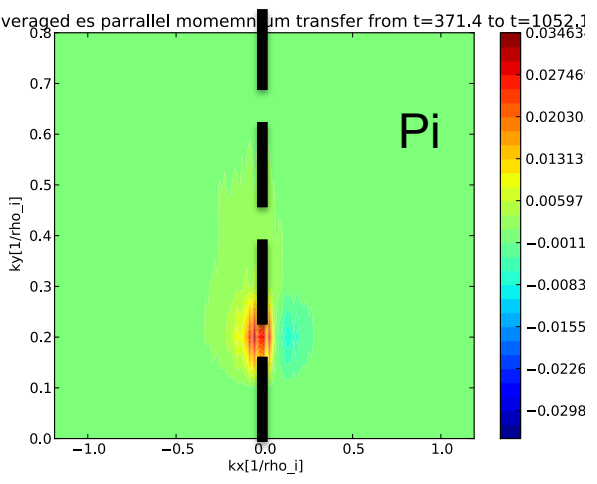


Nonlinear GS2 result

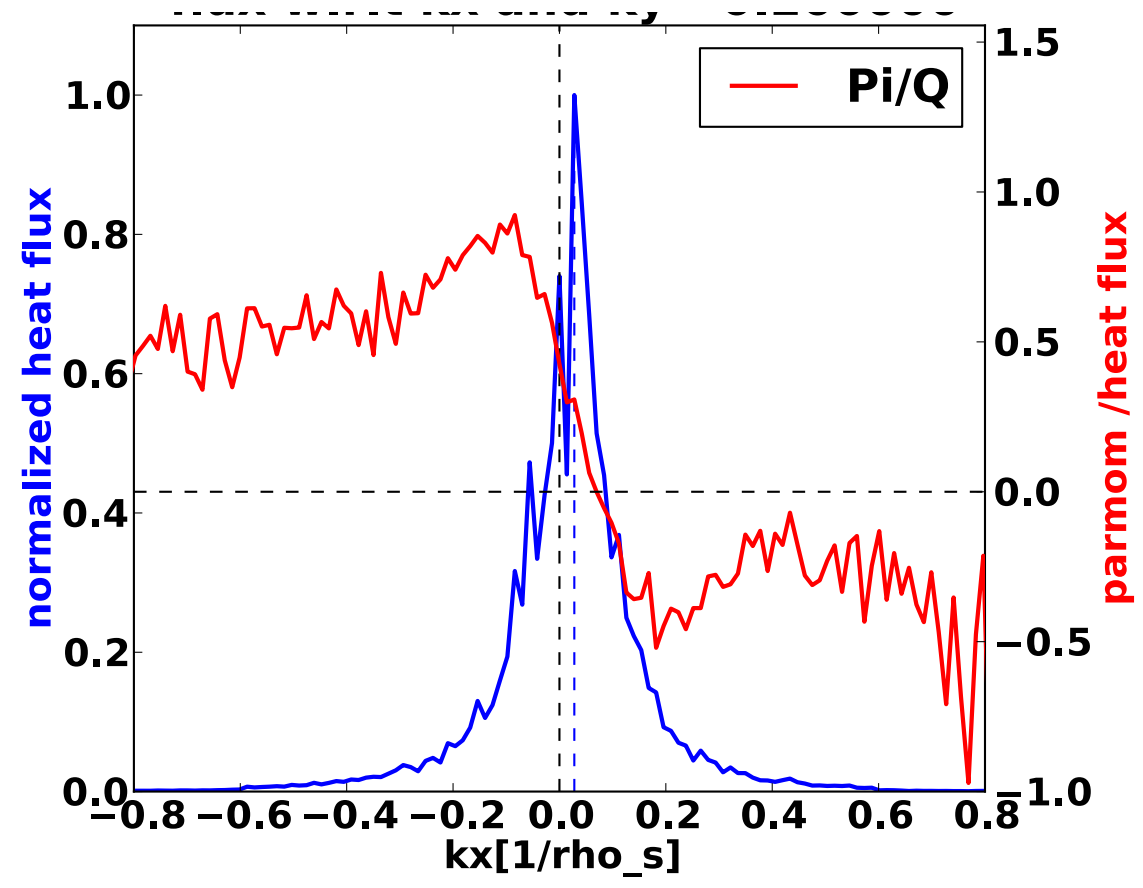
- w/o lowflow



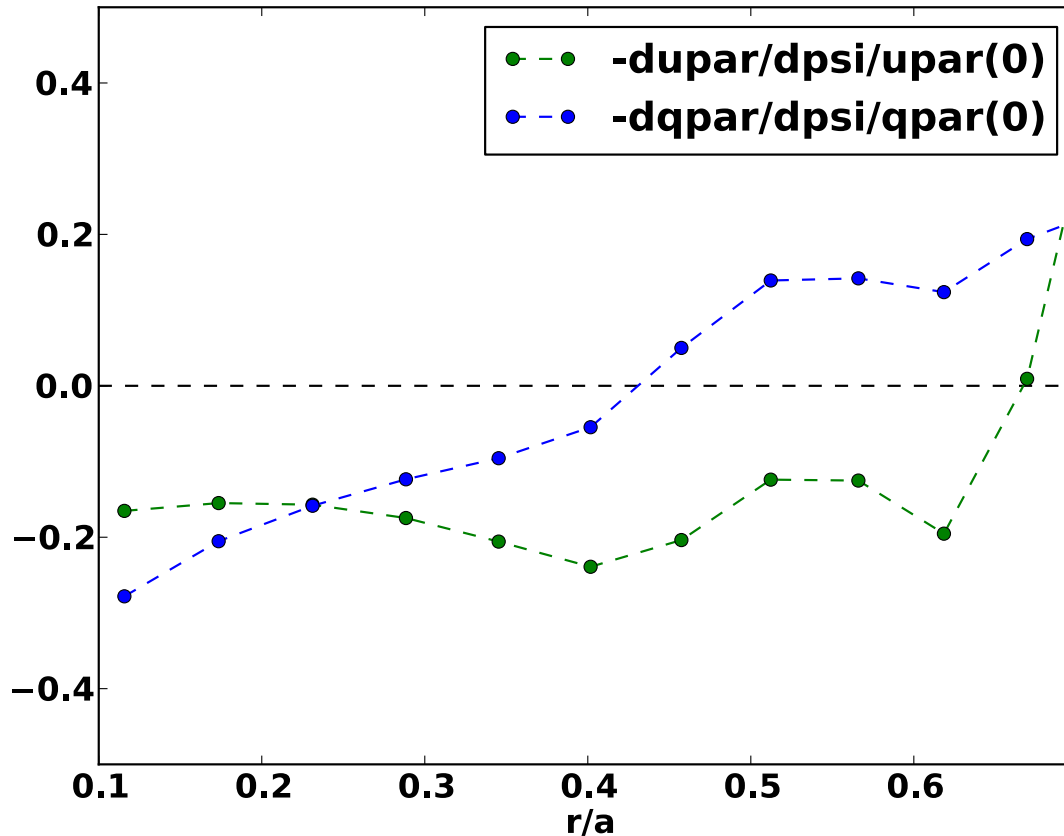
- w/o lowflow



- Q(left) and Pi/Q(right) w/ lowflow for a peak $ky=0.5$



Correlation between parallel heat flow to mom.flux



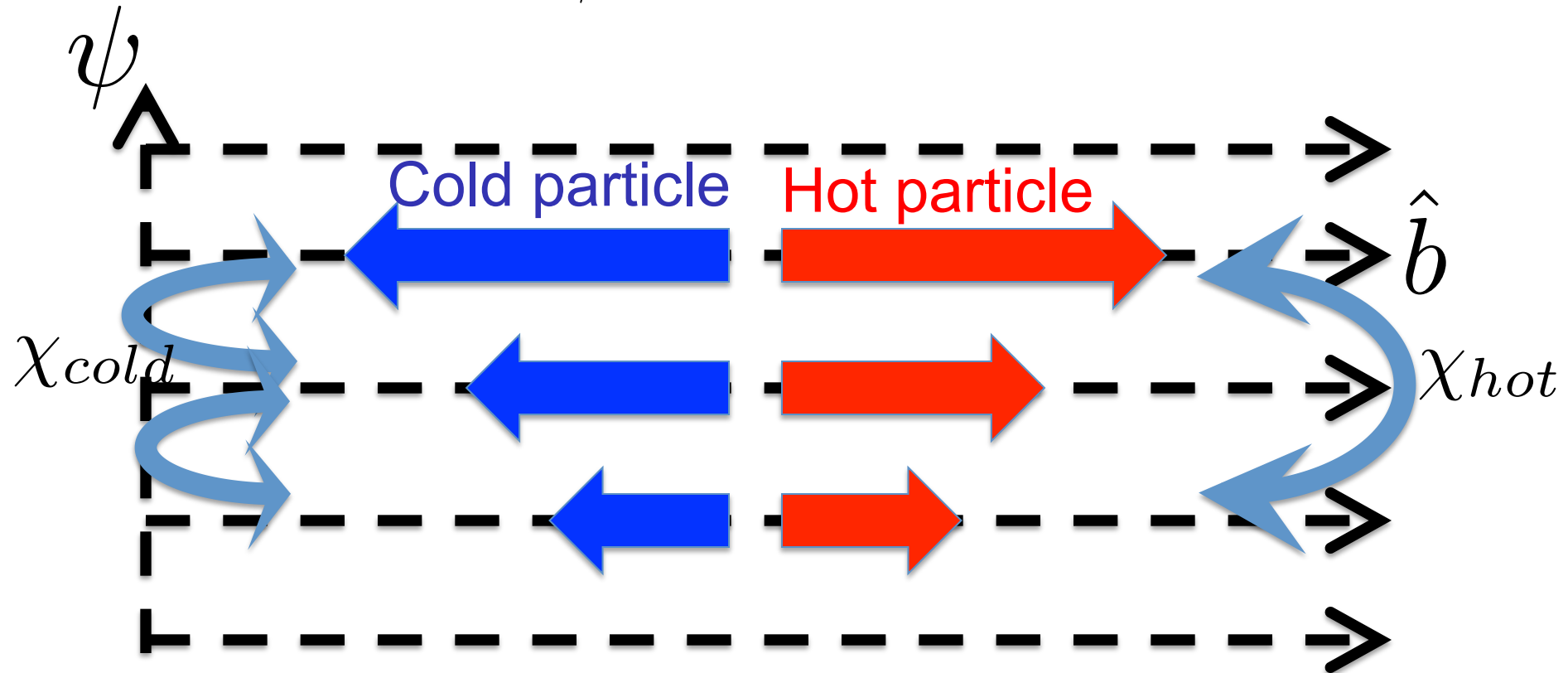
- $u_{\parallel} > 0$, $q_{\parallel} > 0$
- Intuitive sign of parallel flow diffusion

$$-nm\chi \frac{\partial(u_{\parallel})}{\partial r}$$
- The effect of parallel heat flow

$$u_{\parallel} = \frac{1}{n} \int dv^3 v_{\parallel} h_{NC}^1 \quad q_{\parallel} = \left\{ \int dv^3 \frac{1}{2} v^2 v_{\parallel} h_{NC}^1 - \frac{5}{2} v_t^2 u_{\parallel} \right\}$$

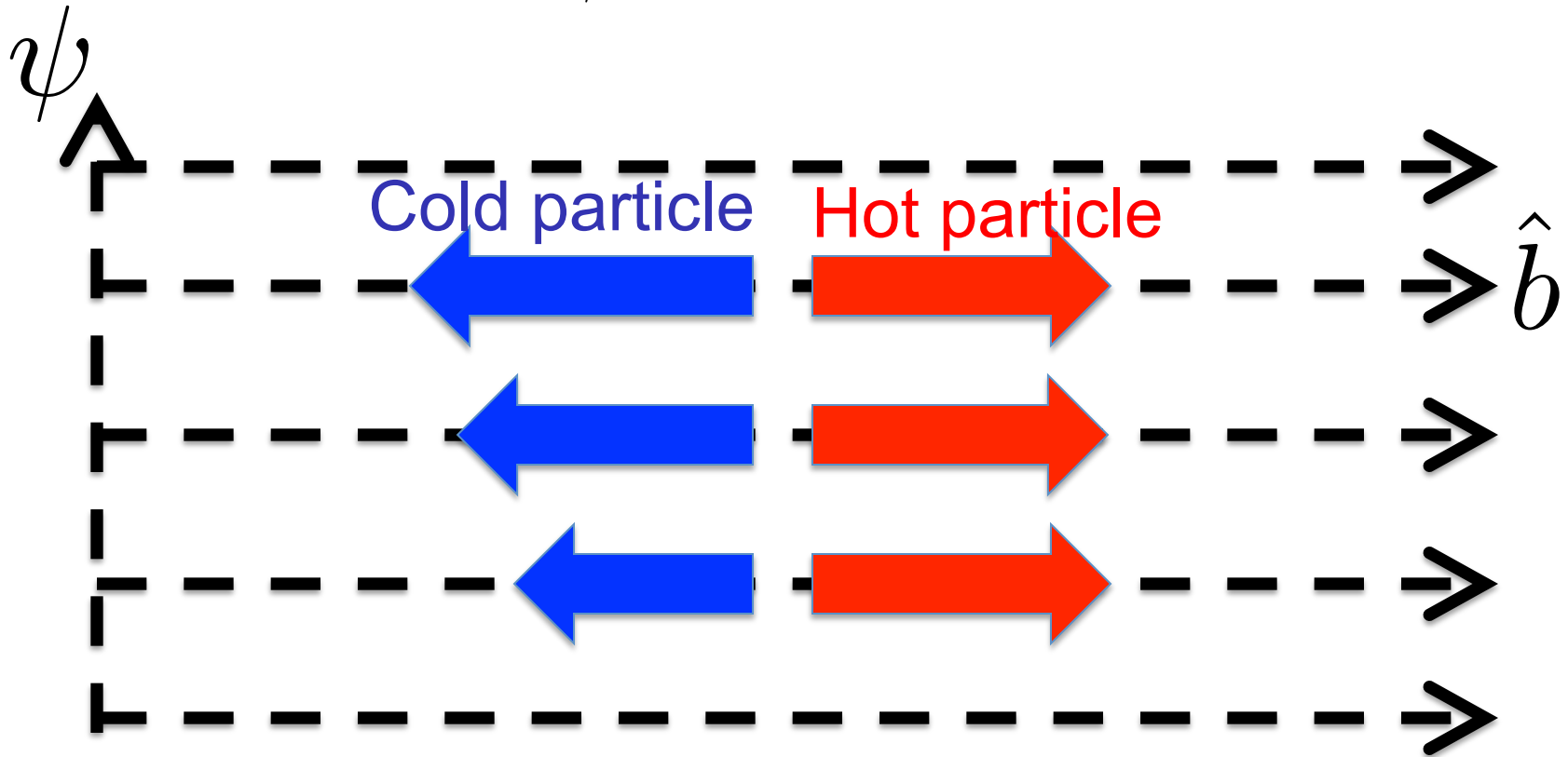
Parallel heat flow gradient induces mom. flux

- Assume $D_{hot} > D_{cold}$
- For a case of $\frac{\partial q_{\parallel}}{\partial \psi} > 0$, it can result in $\Pi < 0$



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