

# What Causes Plasma Transport Across the Separatrix ?

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- Without understanding this, the edge/SOL plasma properties in present tokamaks can not be explained, and so extrapolations to ITER are highly questionable

## Possible physical mechanisms:

- edge turbulence (random electrostatic ExB transport @  $\sim 1-1000$  kHz)
- edge convective cells (stationary electrostatic bumps @  $\sim 0-1$  kHz)
- stochastic magnetic fields (e.g. due to MHD or B field perturbations)
- large scale radial magnetic perturbations (e.g. due to error fields)
- classical collisional transport (including neutrals and X-points)
- non-thermal and non-axisymmetric source effects (e.g. impurities)

## Possible experiments/measurements on DIII-D:

- vary collisionality at fixed (I,B) and look for collisional scaling of SOL width
- reconcile various edge turbulence measurements (probes, BES, microwaves)
- measure edge turbulence vs. poloidal angle (e.g. near X-point and divertor plates)
- measure local time dependence of heat flux at divertor plate (up to  $\sim 100$  kHz)
- follow localized ion, electron or heat pulse injection at edge (along and across B)
- measure edge DC magnetic/electrostatic fields using ion beam probe (e.g. RFQ)