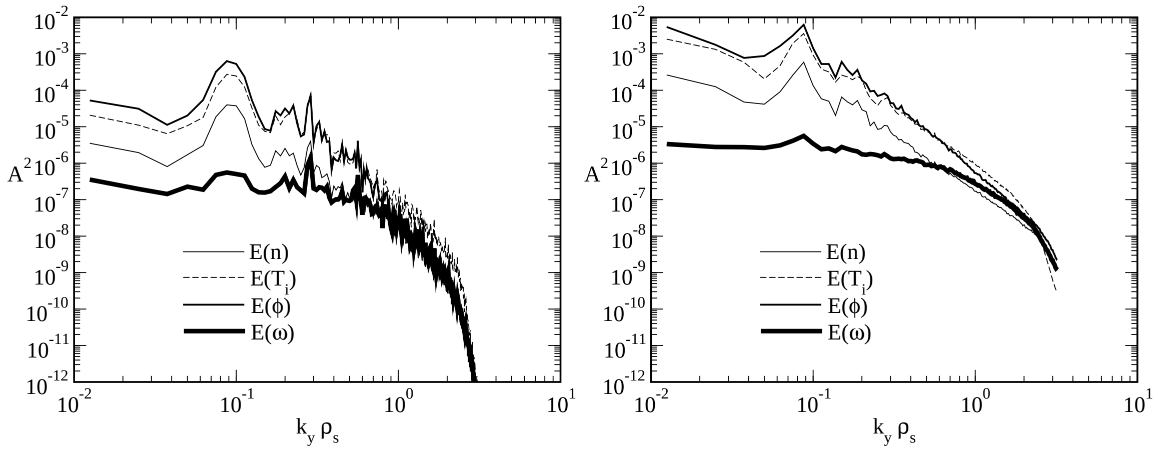

FIG. 5: Perpendicular mode number $k_y\rho_s$ spectra for $t = 38$ (top) and $t = 42$ (bottom) around the peak flux phase. The vorticity spectrum (bold lines) is already flattening down to the ion gyroradius scale for $t = 42$ only a few μs after the maximum linear growth phase.

blowout saturation process.

The transition from linear instability to turbulence is studied during the peak flux phase around $t = 40$. Fig. 5 shows perpendicular mode number $k_y\rho_s$ spectra of the squared amplitude of various fluctuating plasma quantities (density n, ion temperature T_i, electrostatic potential ϕ and vorticity ω) for $t = 38$ and $t = 42$. This time difference corresponds to $\Delta t = 15\mu s$ in physical units and around $70 L_\perp / c_s$ in local drift units, which is only slightly faster than the overshoot and saturation times known from edge microinstability cases [41]. Initially, the ion temperature gradient (ITG) driven microinstability and the ideal ballooning mode (IBM) compete in growth out of the random low-amplitude bath. The ITG mode grows strongest near the separatrix due to radially local steepening by parallel SOL diffusion, which in our simulations may be overestimated by using the standard fluid Bohm outflow boundary conditions. For $t = 38$ the linear IBM is clearly dominant near a toroidal mode number of 9-10 for the nominal AUG parameters, consistent with experimental observations [46]. Around $t = 42$ rapid formation of a turbulent cascade range in the spectra is observed and the vorticity spectrum is already spread out to the ion gyroradius scale ($k_y\rho_s = 1$). This is a manifestation of the role of self generated drift wave turbulence in the saturation process. Because of the way both the diffusive mixing and vorticity scattering nonlinearities enter the drift wave physics [39] the spectrum is held together as a unit, all scales down to ρ_i are involved in the saturation phase of the overall ELM blowout transport. The involvement