Exploring the link between intermittency in scalar dissipation ($\chi$) and energy dissipation ($\varepsilon$) rates SIDDHARTHA VERMA, GUILLAUME BLANQUART, California Institute of Technology — The occurrence of spatial and temporal intermittency in $\chi$, analogous to that seen in $\varepsilon$ for the velocity field, poses a formidable challenge in the formulation of subgrid scale models for $\chi$. As the scalar transport equation is known to be linear, intermittency in the scalar field must be inherited largely from non-linearity in the momentum equation. This occurrence may be explained physically as the coincidence of steepest gradients in the scalar field (which correspond to the largest magnitudes of $\chi$) with those in the velocity field (largest magnitudes of $\varepsilon$), caused by strong straining of material particles. To determine the extent of the inheritance, we attempt to establish a qualitative as well as quantitative correlation between intermittency in $\varepsilon$ and $\chi$. Any external role of the scalar forcing term in the intermittency of $\chi$ is also assessed by using two scalar forcing techniques in homogeneous isotropic turbulence, namely mean scalar gradient forcing and linear scalar forcing. A third, unforced configuration, the turbulent mixing layer is used as well, where scalar fluctuations are sustained naturally by a mean gradient present in the cross-stream direction. Appropriate conclusions are also drawn regarding the relevance of the Schmidt number to the extent of intermittency inheritance, in light of the spectral de-linking that happens at very high Schmidt numbers.