

## **MREM: Multiresolution Regularized Expectation Maximization Algorithm for Image Reconstruction of Poisson Data**

D. D. Dixon (UC Riverside, IGPP), J. Knödseder (CESR-Toulouse), R. Diehl (MPE)

The Expectation Maximization Maximum Likelihood (EMML) algorithm (also known as Richardson-Lucy) provides a Maximum Likelihood (ML) image estimate from Poisson data affected by a non-trivial instrumental response (e.g., PSF). However, like all such ML estimates, it suffers from noise amplification, necessitating some degree of regularization to extract scientifically useful data. Here, we describe a regularization utilizing wavelet thresholding of the EM correction factors, coupled with progressive admittance of wavelets from large to small scales. We term the resultant iteration Multiresolution Regularized Expectation Maximization, or MREM.