GRADIENT MAPS

One of the most important parts of the Maximum Entropy algorithm is the computation of the grad χ^2 map. This is the gradient of the "goodness-of-fit" function χ^2 or, in our case, C with respect to the map pixels. It is a reasonably good representation of the true map, and therefore deserves mention.

The gradient of C with respect to the model modulation profile is very simple:

$$\frac{\partial C}{\partial e_i} = 1 - n_i^2/e_i^2$$

Its derivitatives with respect to the map pixels f_i are then given by the chain rule:

$$\frac{\partial C}{\partial f_i} = \sum_k \frac{\partial C}{\partial e_k} \frac{\partial e_k}{\partial f_i}$$

The last derivatives on the right hand side are simply the modulation patterns, because the e_k are simply the inner product of the modulation patterns with the model map f_i.

The figure below shows the first gradient map of the Maximum Entropy for the same case as the back-projections above. Note the absence of the spurious spin-axis source.