Herschel PACS Data Imaged Using MADmap Software

"Inside the Dark Heart of the Eagle" - the Aquilla Nebula

Credit: ESA and the SPIRE & PACS consortia, Ph. André (CEA Saclay) for the Gould's Belt Key Programme Consortia (http://oshi.esa.int/)

The Photoconductor Array Camera and Spectrometer (PACS) instrument on ESA's Herschel infrared satellite uses extremely sensitive bolometers. However, the noise in these detectors is not white (uncorrelated) but colored (correlated), and these correlations must be carefully accounted for when the data are processed to make images of any observation.

Many Cosmic Microwave Background (CMB) experiments also employ detectors with correlated noise, and for the last dozen years a group of data analysts and computational scientists centered at Lawrence Berkeley National Laboratory (LBNL) have been developing a suite of tools to handle the resulting data, and applying them to experiments ranging from the BOOMERanG balloon to the Planck satellite mission. The resulting Microwave Anisotropy Dataset Computational Analysis Package (MADCAP) includes the MADmap maximum likelihood map-making code. Although MADmap was designed and implemented with CMB data in mind, it was also always intended to be independent of the specifics of any one experiment. As a result, since their data matches the model handled by MADmap, the Herschel PACS team have simply been able to adopt MADmap as their core map-making software.

This work was made possible by start-up funding from the NASA Advanced Information Systems Research and the LBNL Laboratory Directed Research & Development programs, and ongoing support from the NASA US Planck project and the DOE Office of High Energy Physics, with computational resources provided by the DOE's National Energy Research Scientific Computing Center.