CUBE: a new IRAM Science Software

Victor S. Magalhaes[1], Sebastien Bardeau[1], and Jerome Pety[1,2]

[1] IRAM, Institut de radioastronomie millimétrique, 300 rue de la piscine, 38406 Saint Martin d'Hères, France;

[2]Observatoire de Paris, Université PSL, CNRS, LERMA, F-75014, Paris, France

CUBE is an IRAM software package that aims 1) to operate on large Position-Position-Velocity cubes as a whole entity (instead of a collection of images or spectra), 2) to keep the possibility to access any image or spectrum, and 3) to index growing sets of heterogeneous (multi-wavelengths continuum or lines) cubes. CUBE's main capabilities are: FITS files as the default input/output file format; Indexation of data sets; Data and header editing capabilities; a library of data manipulation algorithms, including consistency checks, easy resampling and reprojection, line and image stacking or spectral fitting. In all these tasks, CUBE natively implements parallelization, the treatment of NaN, an integrated handling of units, and the possibility that large datasets do not fit into the available RAM memory. CUBE uses new coding practices: Object Oriented programming (FORTRAN08); clean interfaces with SIC (GILDAS native scripting language) to be able to port CUBE to other scripting languages (e.g., python or julia); and a standardized command structure.