STRUCTURAL ANALYSIS OF GALAXY MORPHOLOGIES

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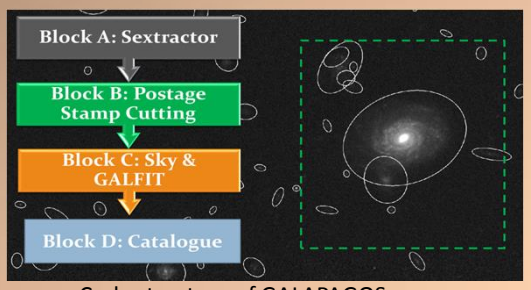
Automated survey analysis on modern supercomputers

- automates source detection, 2D-light profile modeling and catalogue compilation for large survey applications
- is capable of processing a complete set of survey images based upon a single setup script
- robustly estimates the local sky background flux for object profile fitting
- automatically cuts postage-stamp images, required for many other applications, e.g. morphological classification
- is optimized for speed and robustness



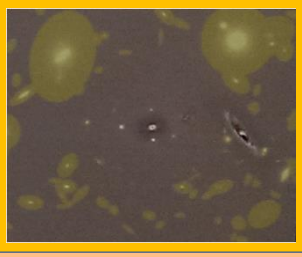
Code structure of GALAPAGOS

Dark matter map for the STAGES survey (Abell 901/2)

Galaxy light profile modeling using GALFIT

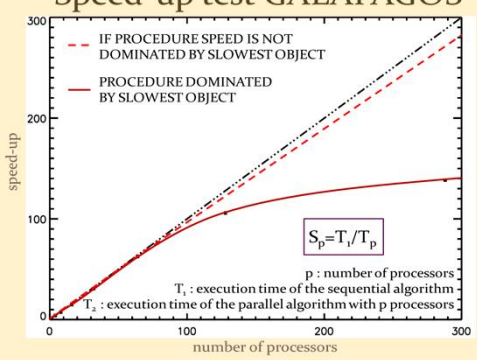
A profile is fitted to several galaxies simultaneously (original LEFT and LEFT BOTTOM, model BOTTOM CENTRE) . Many objects are masked and excluded from the fit altogether (RIGHT BOTTOM).

The axisymmetric Sérsic profile is applied as a first approximation and can be amplified by Fourier mode expansion.

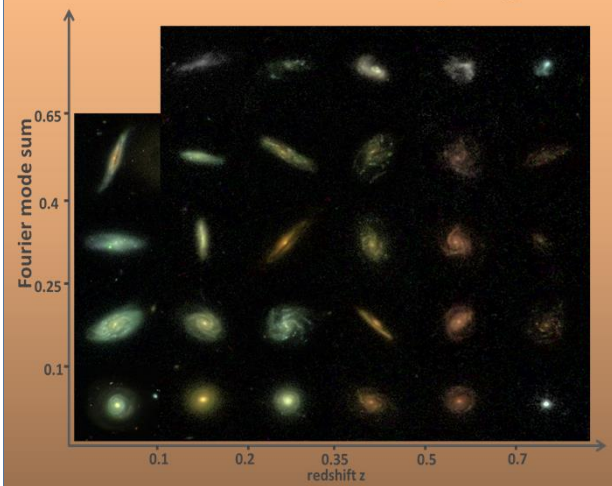


Parallelization

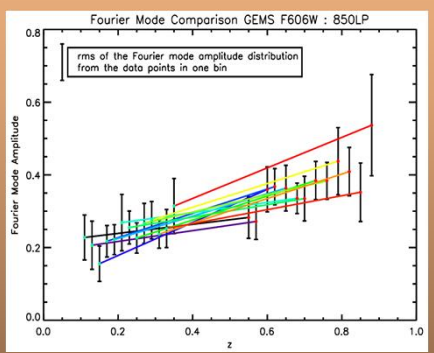
The latest version of GALAPAGOS was recoded in C and uses a MPI-based MASTER-SLAVE concept. GALFIT jobs can be distributed on a large number of processor nodes allowing for the application of sophisticated light profile models (Fourier modes, multicomponent fitting).



Morphological distortions quantified with Fourier modes



- Quantifying asymmetric distortions of Sérsic isophotes using GALFIT Fourier mode expansion
- Study statistical evolution as a function of redshift and environment



The LEFT plot shows a comparison of Fourier mode amplitudes for galaxy profiles from the GEMS survey between the F606W and the correspondent 850LP bands in bins of 0.02z.

A higher Fourier mode amplitude indicates a stronger morphological deviation from a pure axisymmetric Sérsic profile.