SHAPE v5

Get your science in Shape!

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Introduction

Shape is an interactive morpho-kinematic 3D modeling software with volume rendering and radiation transfer (Steffen et al, 2011). In the new version 5 new tools include hydrodynamic and molecular modeling capabilities, but also more accurate mesh modeling. The user interface has been modernized and the installation procedure has been greatly simplified.

New Modules

- Hydrodynamics
- Fields (magnetic & gravitational fields that can be used for radiation computations)
- Filters (selective filters of physical properties that can be applied to any 3D object)
- Desktop (module and file management)

Other salient new features

- ShapeMol (CO radiation transfer)
- Image displacement modifier (Images determine mesh geometry)
- Image texture modifier (Images determine emission structure)
- Powerful “universal” geometry modifier
- Interactive spline functions instead of piecewise linear functions yielding smoother functions
- High resolution rendering
- Customizable Tool Bar
- Dust grain presets for amorphous carbon, silicate & graphite
- Relativistic Doppler-boosting and –shift
- Video tutorial based learning center

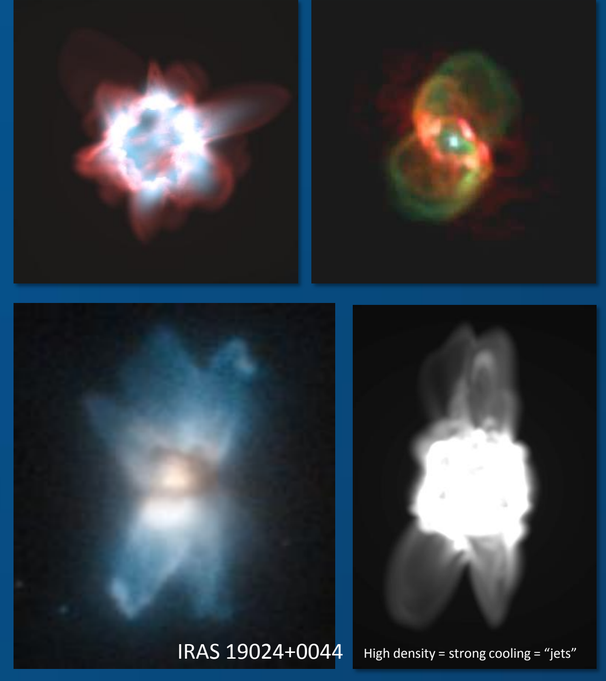
Get involved

We invite users to help improve Shape by

- Writing documentation
- Recording video tutorials
- Suggesting or developing new functionality
- Testing physics functionality
- Reporting bugs

Hydrodynamics

An Eulerian hydrodynamics module is fully integrated into the interactive 3D framework of Shape. Initial and boundary conditions are set up interactively in the 3D Module.

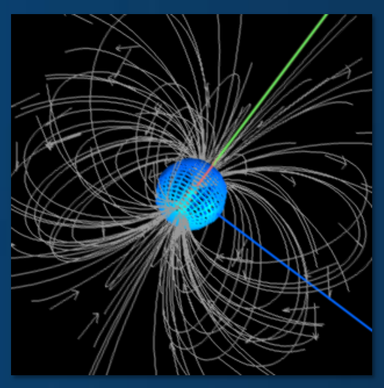


Interactive real-time preview is available and data analysis and visualization can be done the usual way within Shape. Steffen et al., 2013, MNRAS, online.

Molecular Transfer

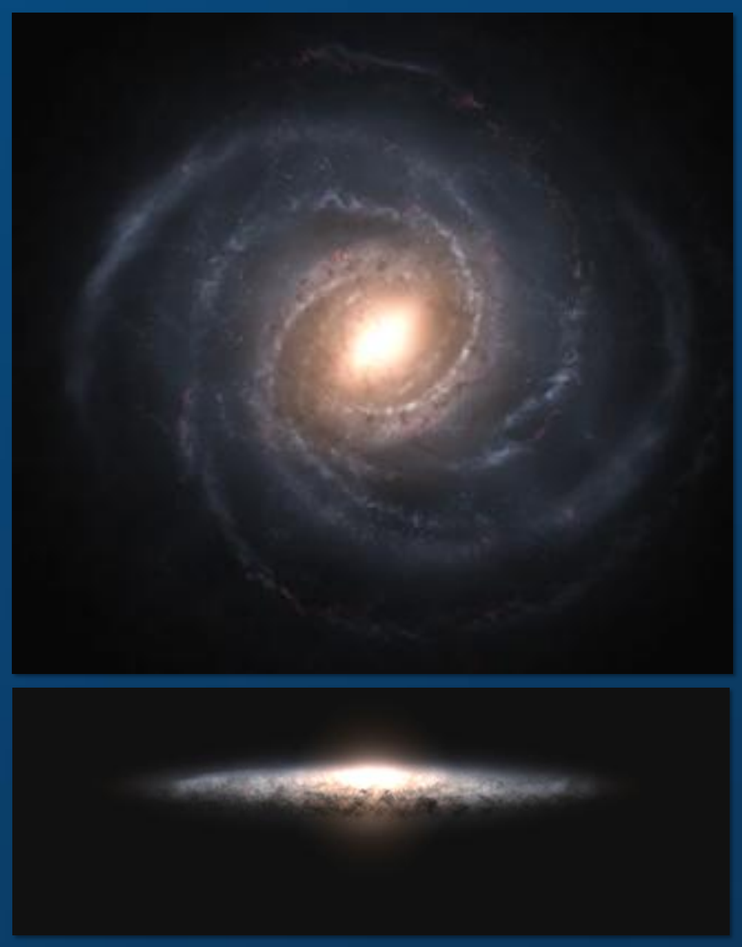
Accurate non-LTE calculations of line excitation and radiative transfer in the 12CO and 13CO J=1-0 to J=17-16 lines. The large-velocity gradient (LVG) approximation is used to easily generate realistic synthetic maps to test against interferometric observations, as well as synthetic line profiles to match single-dish observations (see Santander-García, 2012, A&A, 545, 114 and poster by Santander-García, APN VI).

Fields

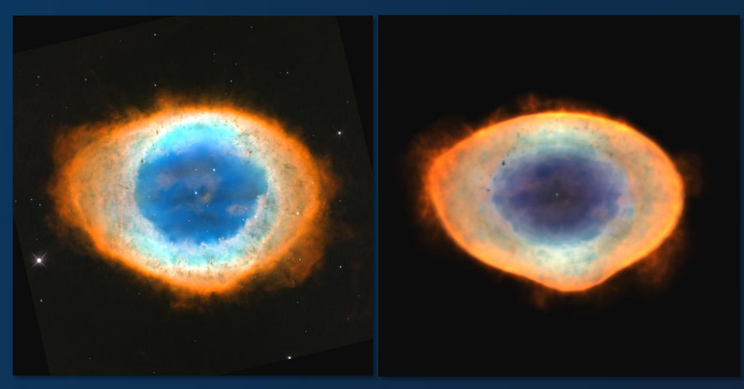


Various types and structures of fields, including magnetic and gravitational, can be generated and visualized.
They can be used for the computation of radiation, such as cyclotron or spectral lines near compact objects.

High-resolution rendering



A new renderer allows high resolution rendering and 3D grid generation without a high cost of RAM. It is particularly useful for realistic rendering and generation of volume data sets for real-time visualization in planetariums. The images above were rendered from a volumetric Milky Way model built in Shape for real-time visualization in mobile planetariums designed by “Digitalis Education Solutions”. The volume grid is a 512^3 voxel cube with RGBA color channels.



Comparison of an image of the Ring Nebula (left) and a Shape model (work in progress). The new Image Texture Modifier allows the transfer of detailed structure from observations to the model. Here,this has been used extensively.

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