



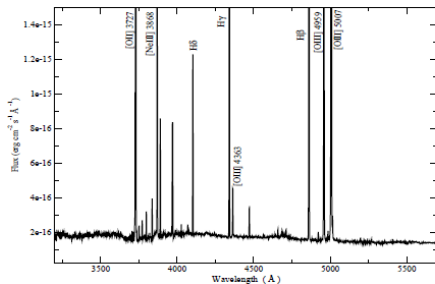
Estallidos 3D

Yago Ascasibar
(Universidad Autónoma de Madrid)

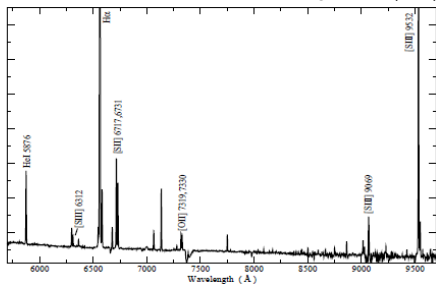
Challenges for the new decade
Salobreña, 08/03/10

- 1 Introduction
- 2 Models in 1/2 D
 - Cloudy
 - Practical applications
- 3 Models in 3D
 - Mocassin
- 4 Challenges for the new decade

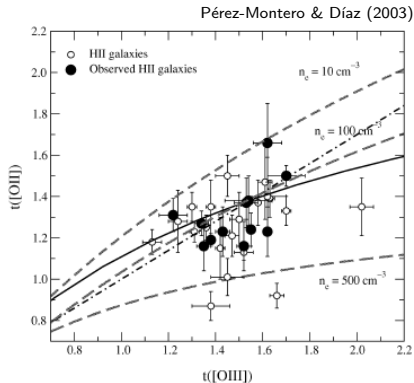
Long-slit spectroscopy



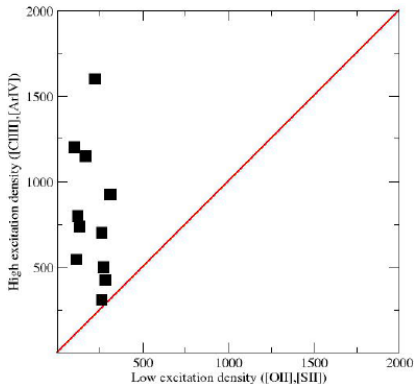
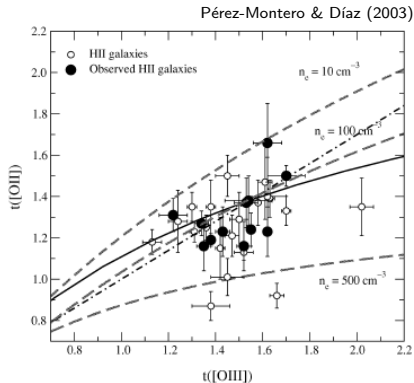
Hägele et al. (2006)



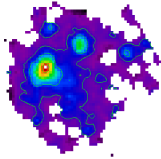
Long-slit spectroscopy



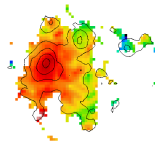
Long-slit spectroscopy



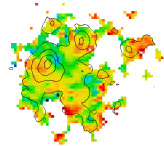
Integral field spectroscopy



$H\alpha$

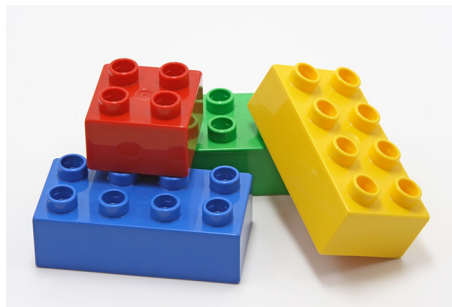


$OIII / H\beta$



A_V
García-Benito (2009)

Theoretical models



Half-dimensional models

Physical model



Hydrostatic equilibrium



Hydrostatic equilibrium



gravity



radiation

Hydrostatic equilibrium



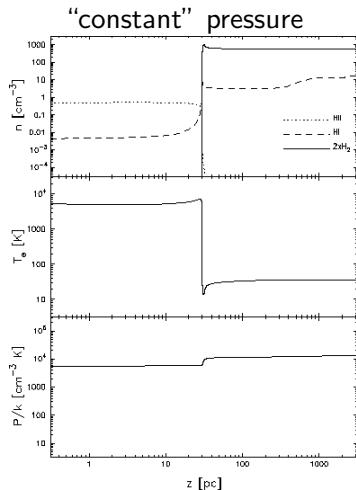
gravity



radiation

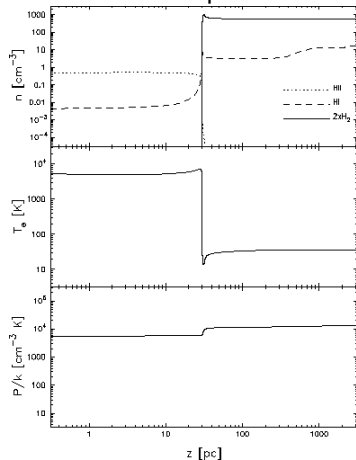
$$\nabla \vec{P}_{\text{gas}} = \rho_{\text{gas}} \times (\vec{g} + \vec{a}_{\text{rad}})$$

Hydrostatic equilibrium

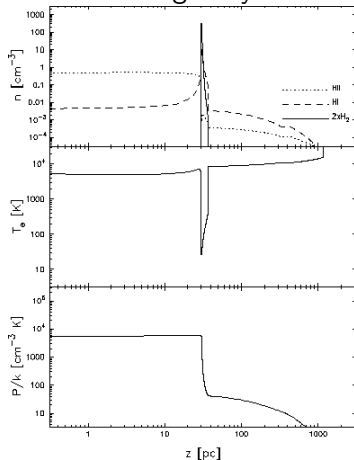


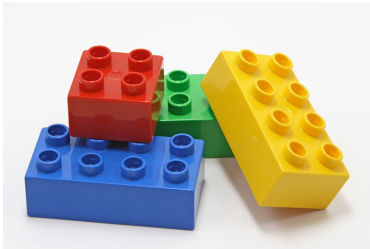
Hydrostatic equilibrium

“constant” pressure



with gravity



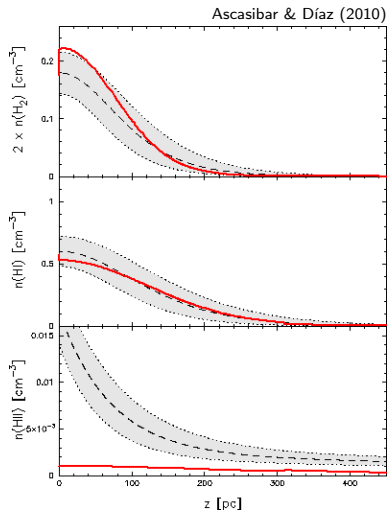


Main result

- It (almost) works

Depends on...

- Ionizing continuum
- Gravitational potential
- Magnetic field
- etc

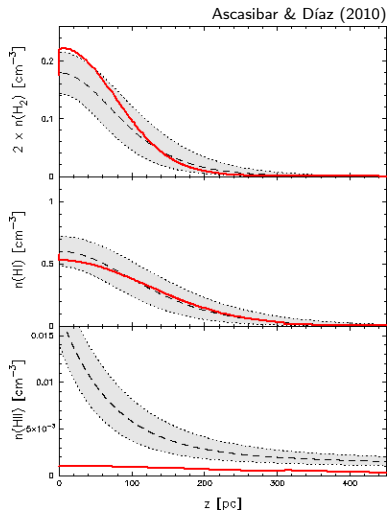


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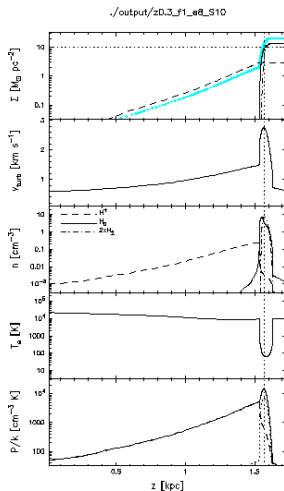
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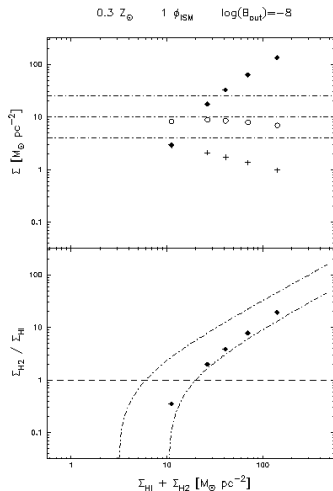
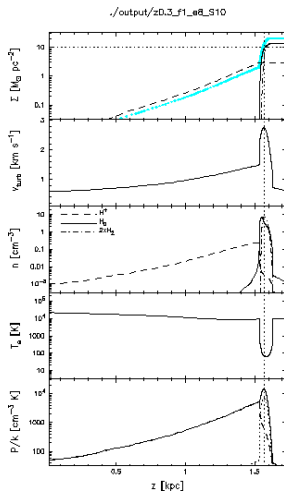


Star formation and molecular hydrogen in disk galaxies

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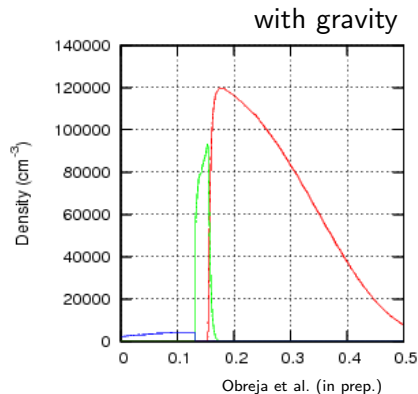
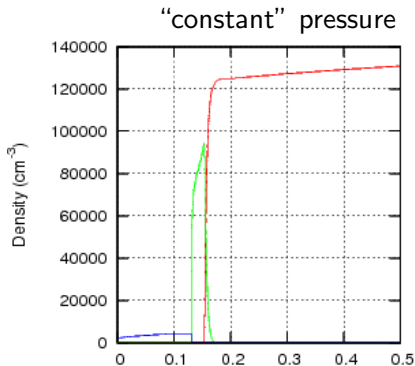


Star formation and molecular hydrogen in disk galaxies

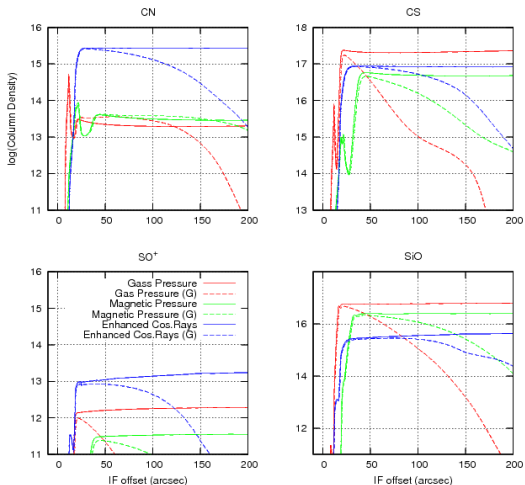


The internal structure of HII regions

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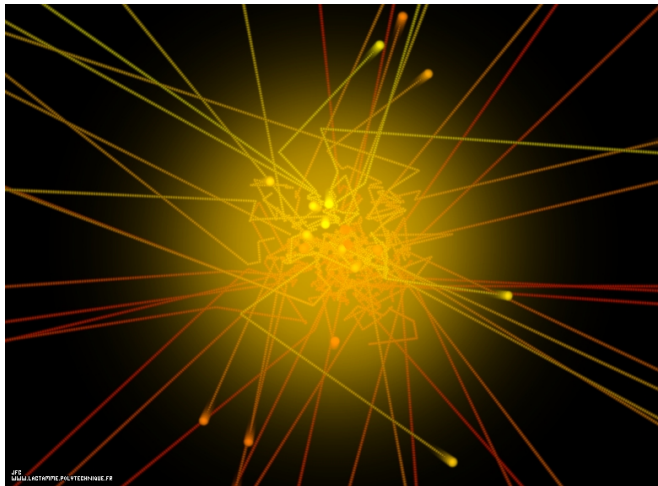


The internal structure of HII regions



Going 3D

MONte CARlo SimulationS of Ionized Nebulae



MONte CARlo SimulationS of Ionized Nebulae

Advantages

- 3D !!!

Problems

- Slower
- No continuum
- No molecules

MONte CARlo SimulationS of Ionized Nebulae

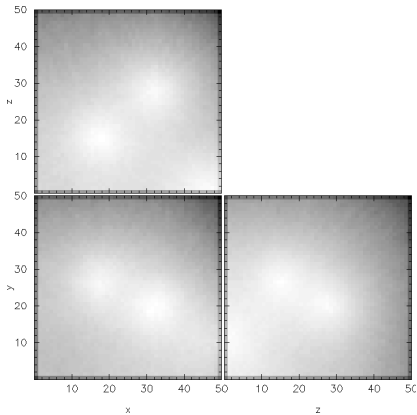
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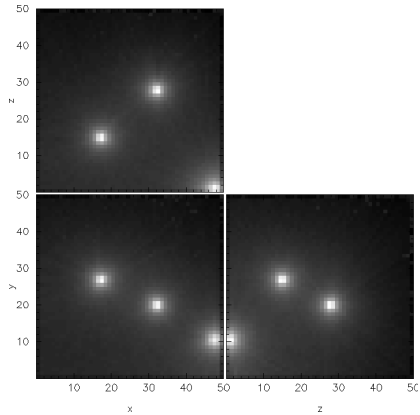
Problems

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- No molecules

(Very) preliminary results



H β



[O III] 4959

Challenges for the new decade

Scientific goals

Internal structure of HII regions

- Density
- Temperature
- Radius

Interpretation of IFU data

- Partial coverage
- Non-local ionization

Galaxies at high-redshift

- Effects of structure

Photoionization and star formation

- Molecular hydrogen
- Galaxies in clusters

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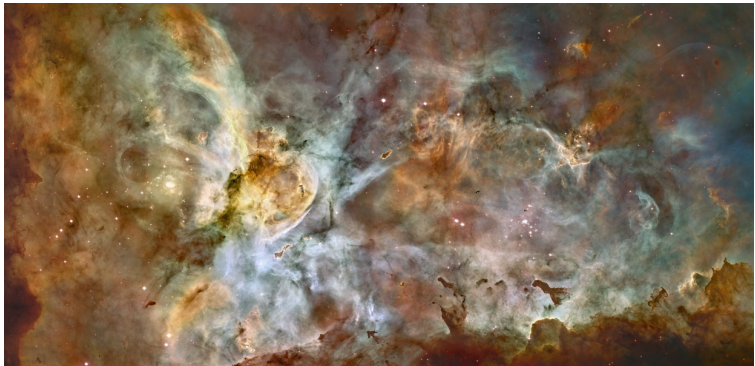
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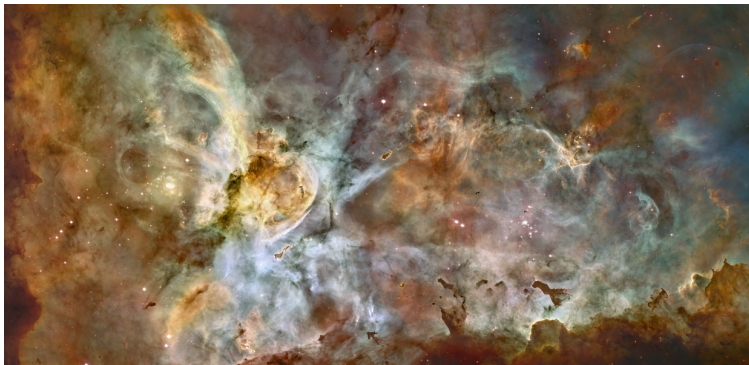
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Challenge



Challenge



Thank you