The kinematics of the barred spiral galaxy NGC 1291

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Why study barred spiral galaxies?

Bars form naturally in unstable disks
Bar fraction decreases with increasing $z$
Bar fraction is similar in field and clusters

Bars are internal evolution agents, and might tell us something about the dark halo
Athanassoula (2002)

Live halo  Rigid halo

Sheth et al. (2008):

Barazzi et al. (2009): little difference between cluster and field
NGC 1291 prototype SB0/a barred spiral with outer ring a bar within a bar relatively isolated: two tiny companions

Galex NUV

IRAC 8.0 µm

240 sec vs. 7.8 sec

IRAC 3.6 µm

2MASS
metallicity problem - Perez & Freeman 2006

1. X-ray 0.1 x solar
2. stars 1.1 x solar
3. HII-regions solar

so how did the low metallicity gas arrive in the central parts?

and why is the ring so metal rich?
Invariant manifolds around L1 and L2 - these allow migration of stars from inner to outer regions, - smearing out of metallicity gradient

BUDDA decomposition code
(see Gadotti 2008 a & b for more work with this code)
VLT observations

with GIRAFFE
Ca II triplet

Figure 1: left: IFU positions for NGC 1291.
HI data with Australia Telescope Compact Array
HI kinematics: position-velocity diagram
Comparison with numerical simulations
Athanassoula & Misiriotis (2002)
the 'bar within bar' is not simulated ...
Conclusion so far:

most likely, the bar is from a disk dominated case
S4G : Spitzer Survey of Stellar Structure in Galaxies

Sheth et al. (30 people) warm mission programme

- about 2300 galaxies within 40 Mpc
- 3.6 and 4.5 \( \mu m \) images
- some of the goals are :
  - the outer disks of galaxies
  - scaling relations, etc.
  - surveys of bars, rings, lenses, spiral arms
  - relation with environment

- website : http://s4g.caltech.edu