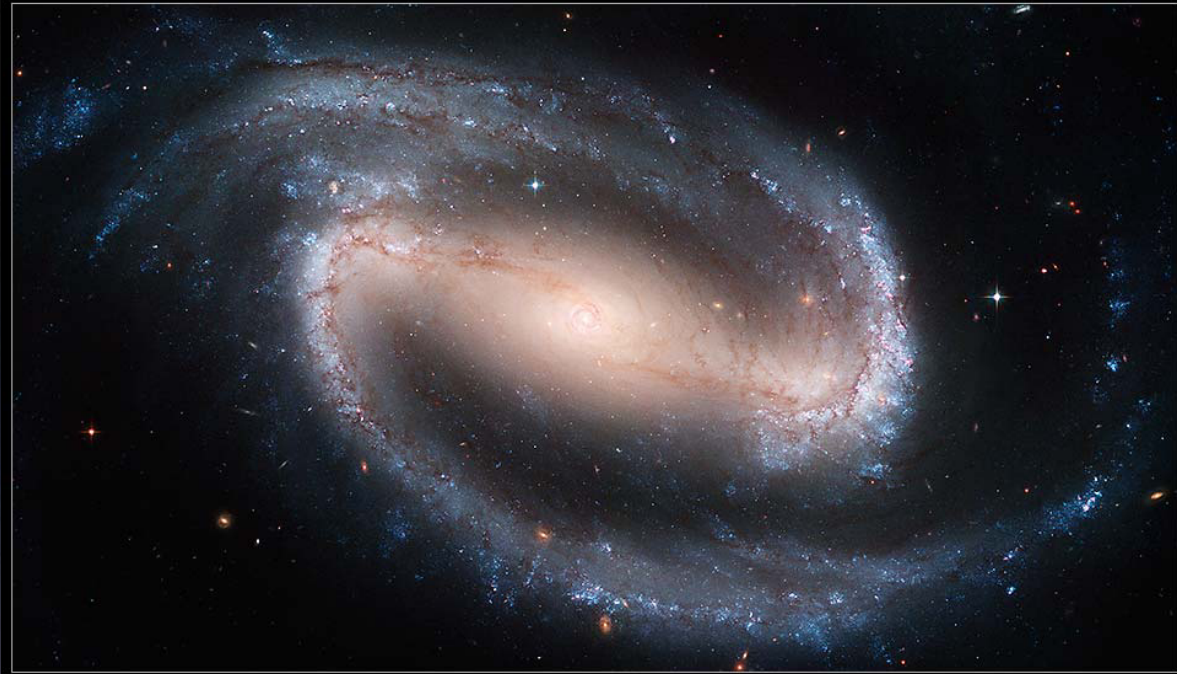# Star-Forming Nuclear Rings in Spiral Galaxies
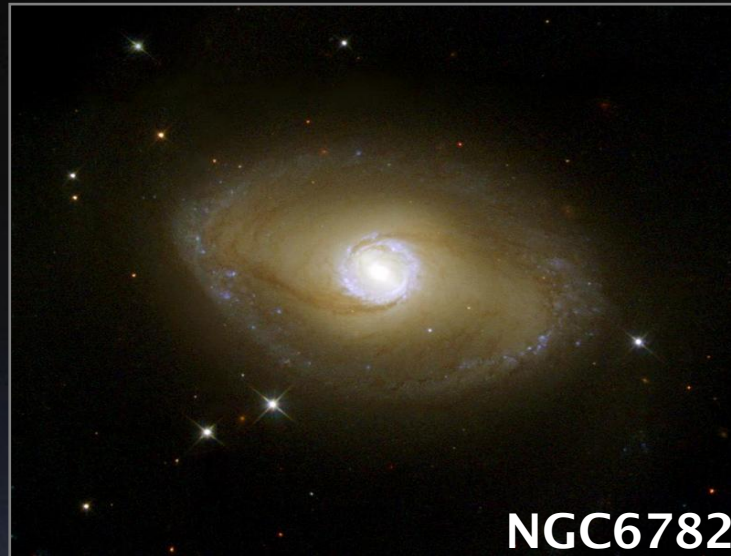

Jesús Falcón-Barroso

T. Böker (ESTEC), **E. Schinnerer** (MPIA), **J. Knapen** (IAC), **S. Ryder** (AAO)
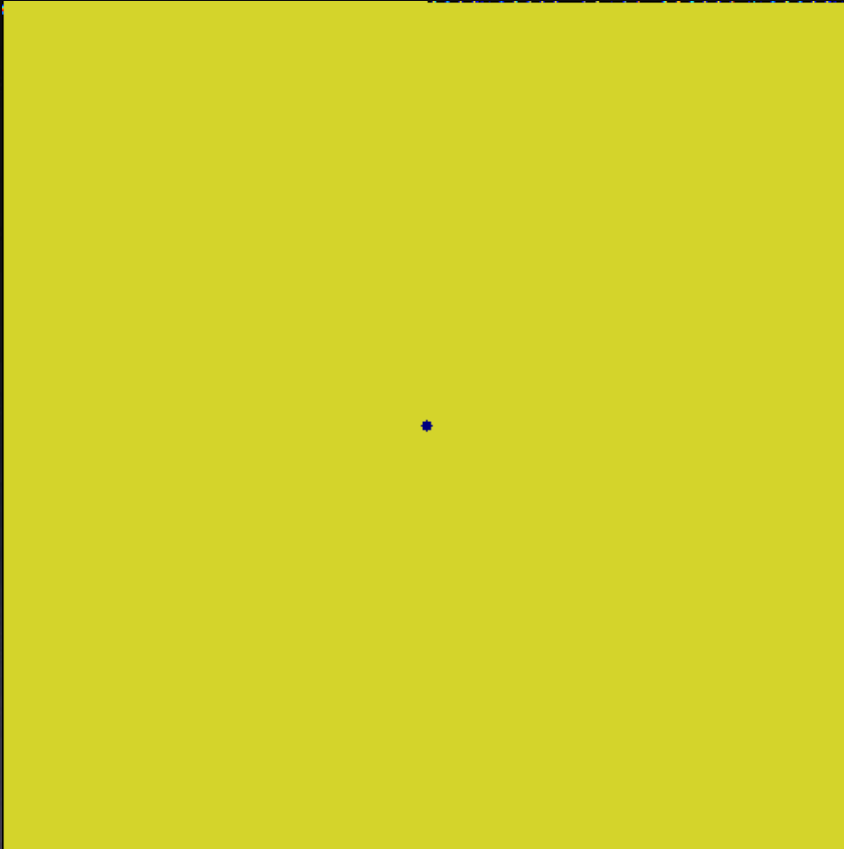
ESTEC Inter-Departmental Science Workshop [Aug 2008]

Motivation

NGC4314   NGC6782   NGC7742

- Produce high levels of star formation

- Influence the dynamical fate of the galaxies they live in

- Importance for secular evolution

- Relation to the feeding of the nuclei (e.g. NCs, BHs or CMOs)
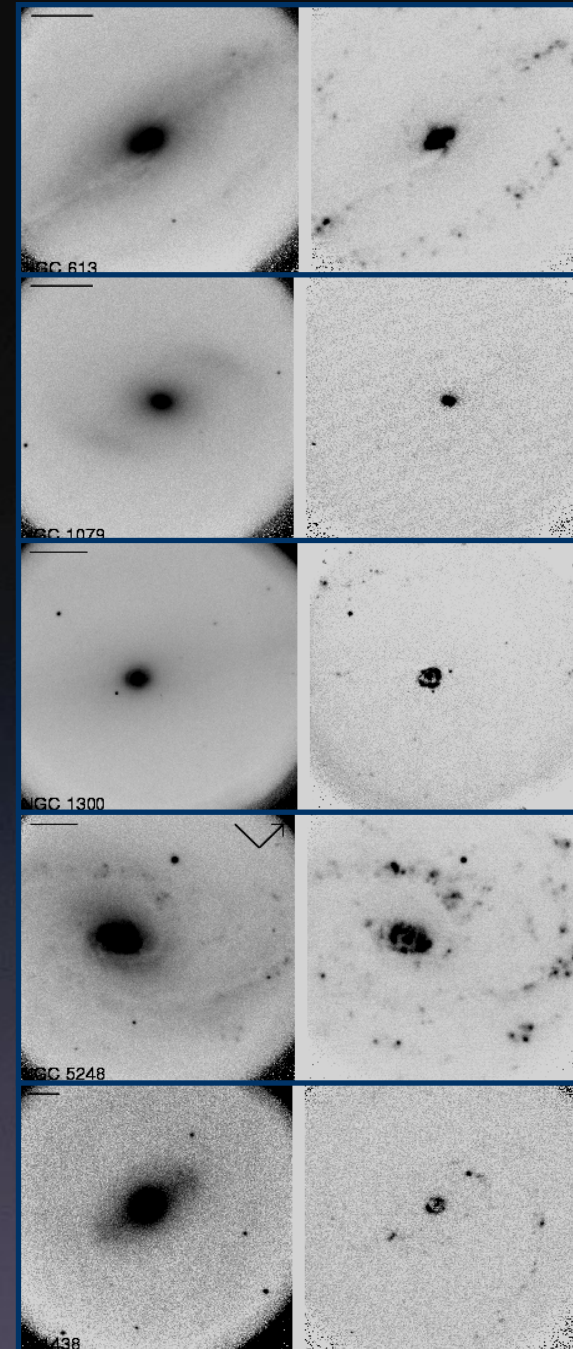
How do nuclear rings form?

Piner, Stone & Teuben (1995)

• Gas accumulation around dynamical resonances

• Usually associated to barred galaxies

• Nuclear rings are found in 25% of spiral galaxies (predominantly early-types)

Sample & Data

- 5 Star-forming nuclear rings from Knapen et al. (2006)
  - NGC0613
  - NGC1079
  - NGC1300
  - NGC5248
  - IC1438

- SINFONI NIR (1.1 - 2.45 μm) integral field spectrograph at the VLT
  - 8x8 arcsec^2, 0.125 arcsec/px
  - R ~ 1500 over full wavelength range
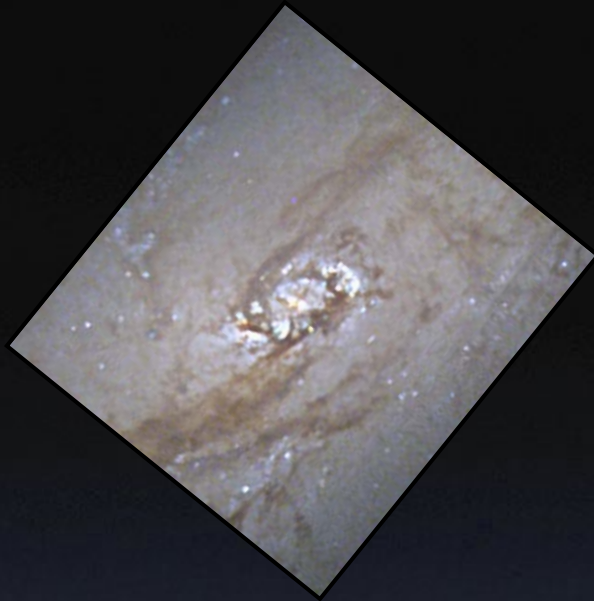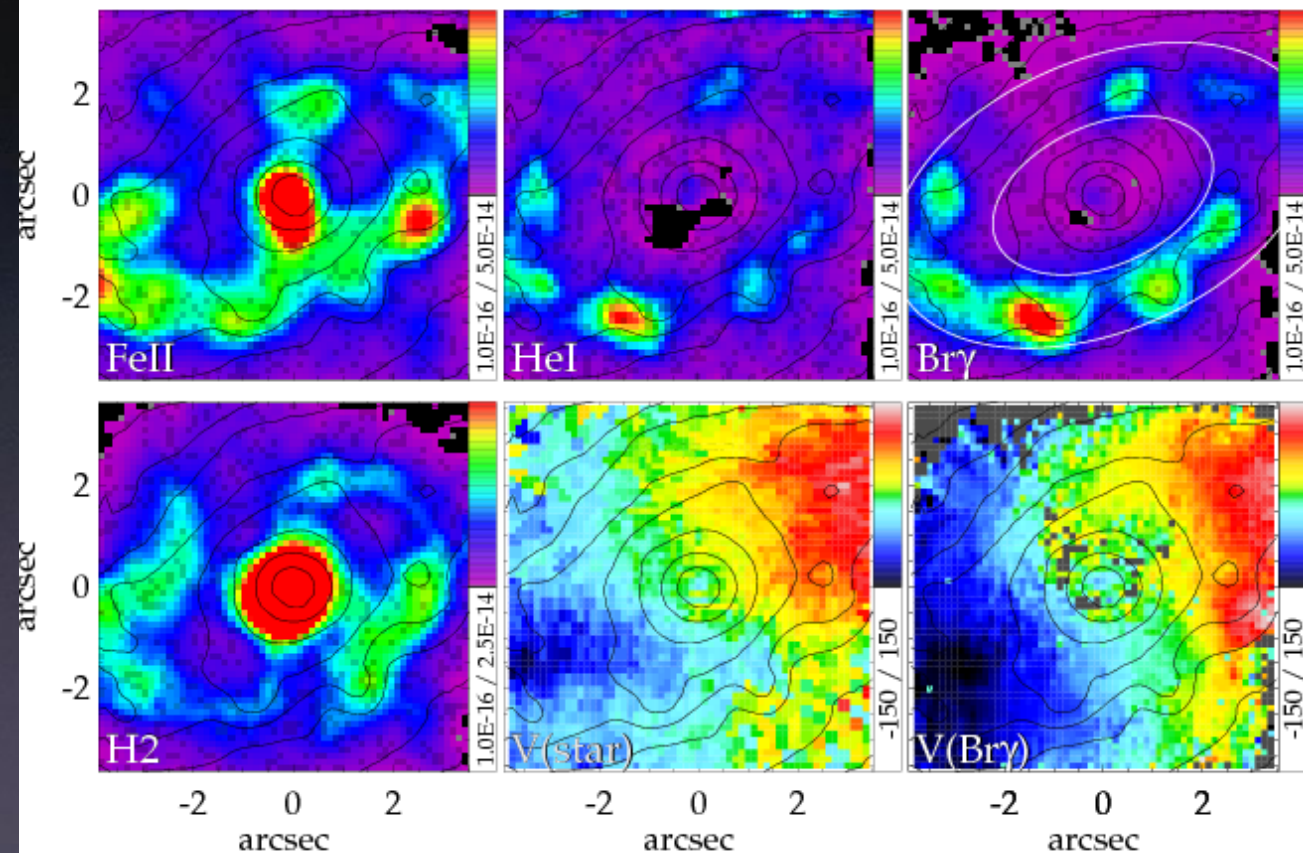
NGC613: integral-field observations

Image courtesy of Nik Szymanek

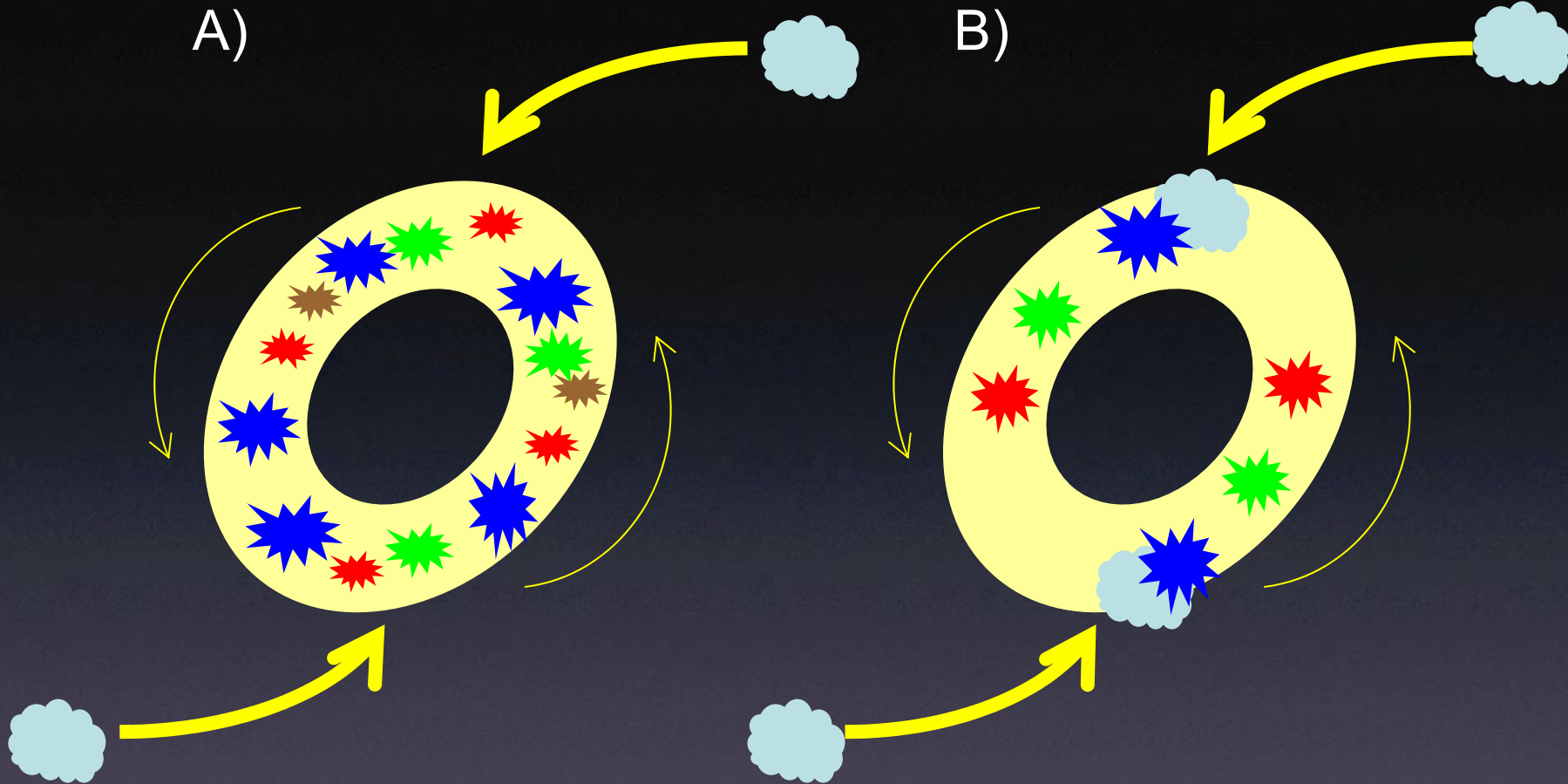SINFONI observations

Star-forming Nuclear Rings

How does SF progress along the ring?

T. Böker, E. Schinnerer, J. Knapen, S. Ryder

Falcón-Barroso et al., ESO Messenger, Dec. 2007 issue

Böker et al. (2008) [AJ, 135, 479]
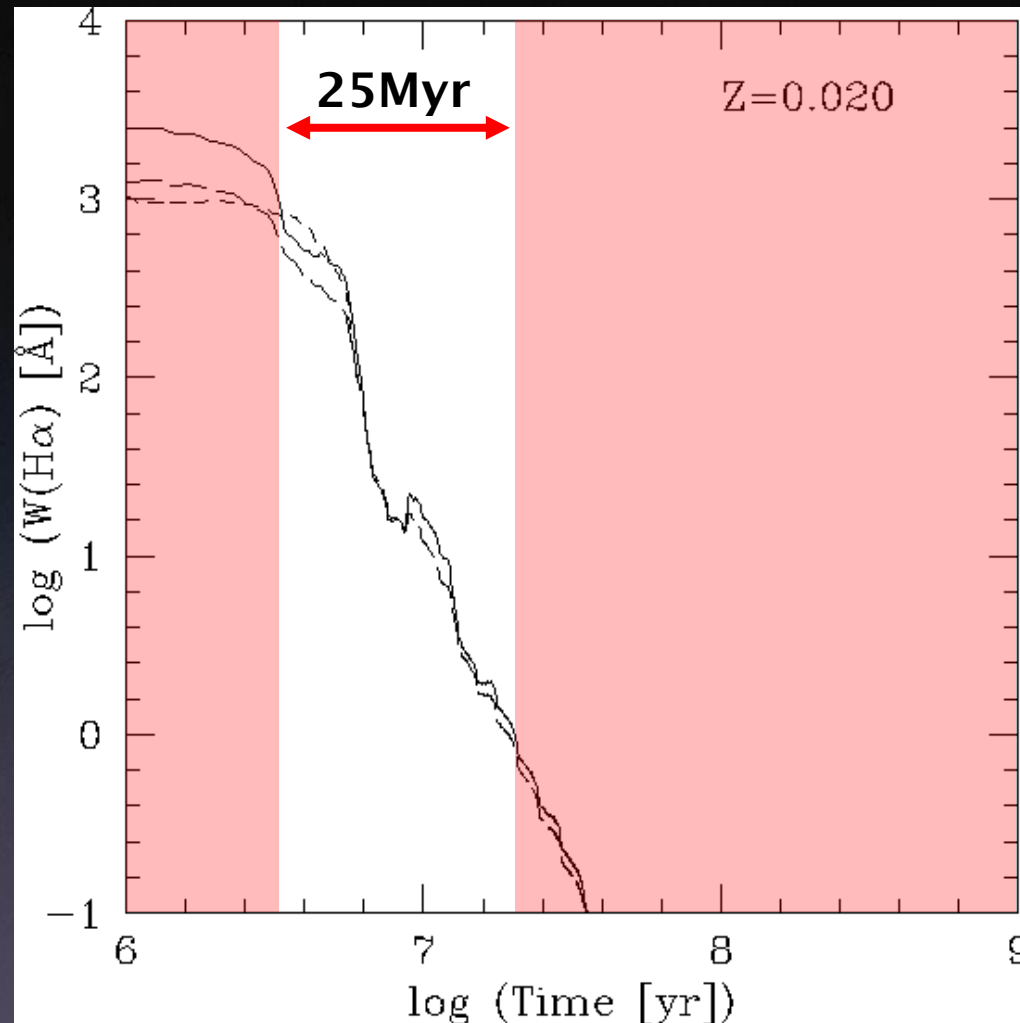
Star formation along the ring

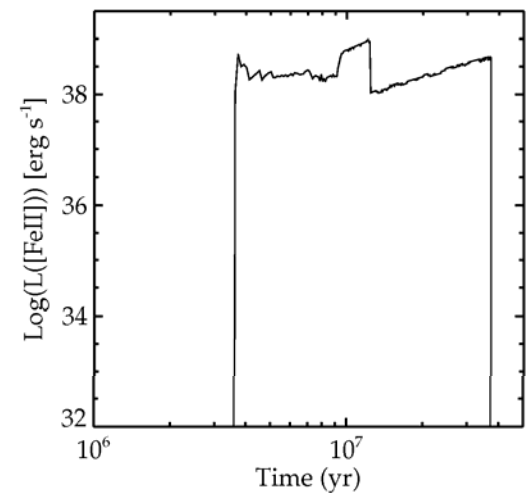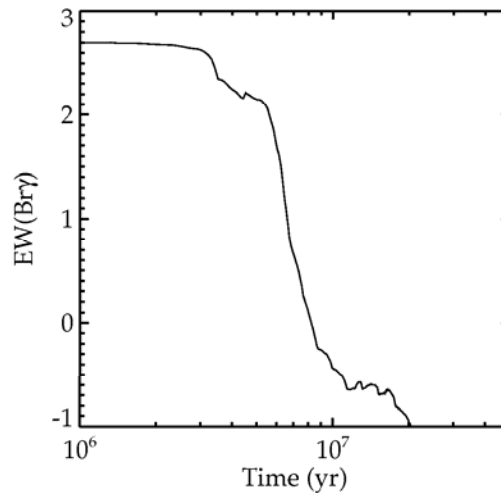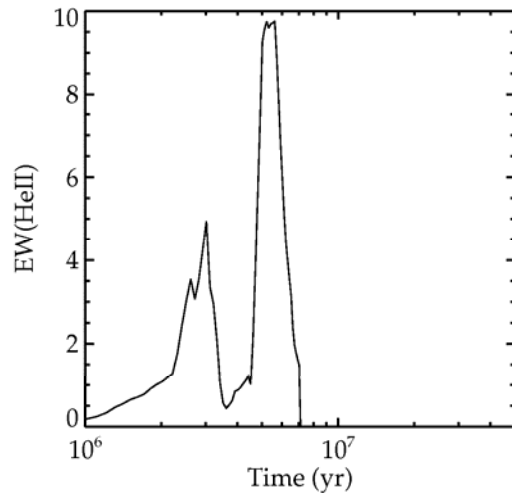A)

B)

"Popcorn" model

"Pearls on a string" model

Measuring the hot-spots ages

- The "problem(s)" with Hα EW

Measuring the hot-spots ages

- He I $\lambda 2.06\mu m$ (HeII $\lambda 4686$)
  - Most massive stars
  - Ages < 5 Myr

- Brγ $\lambda 2.16\mu m$
  - Young stellar populations
  - Ages < 10 Myr

- [Fe II] $\lambda 1.64\mu m$
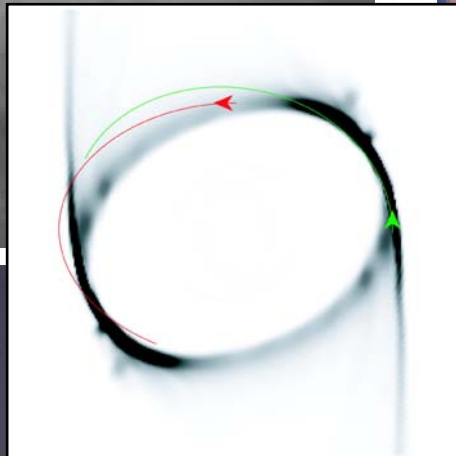 - Supernova remnants
  - Ages < 40 Myr

Starburst99 models for an instantaneous burst

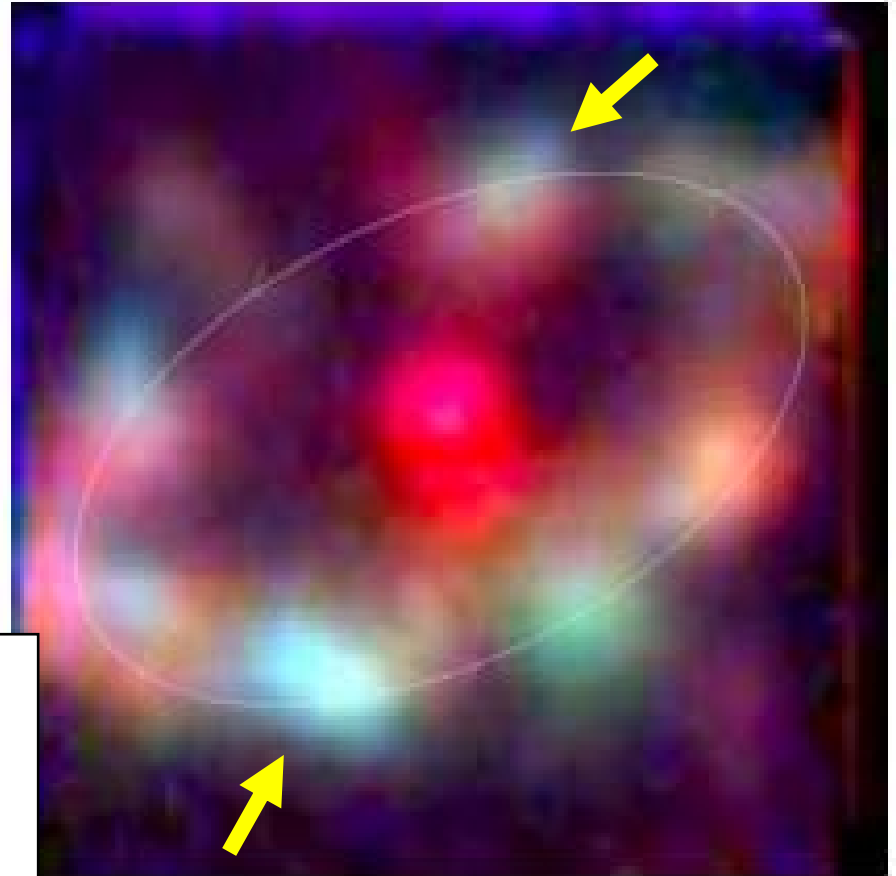use relative ratio of HeI, Brγ, FeII as qualitative age indicator

Testing the 'Pearls on a String' scenario

NGC0613

HST/WFPC2 F606W

Regan & Teuben (2003)

HeI   Brγ   FeII

The End