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Spineto

June 10th, 2015

Stirring Up the Gas: Star Formation and Powering High Pressures in galaxies 10 Billion Years Ago

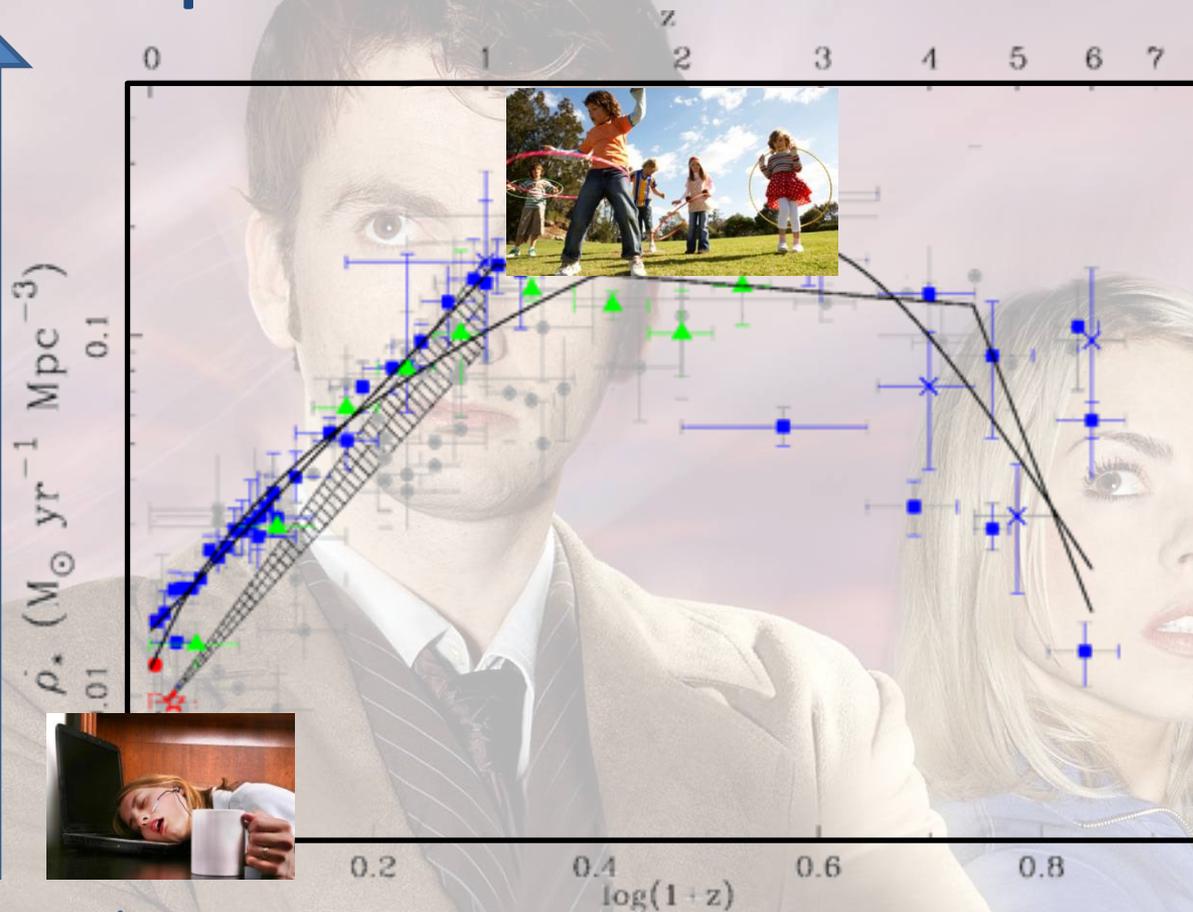
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An epoch of intense activity

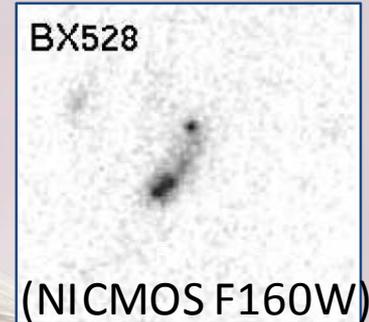
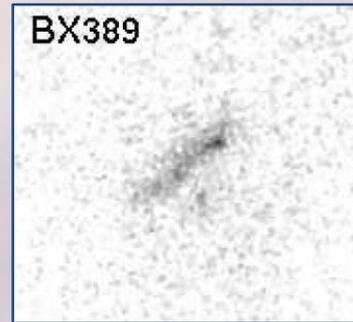
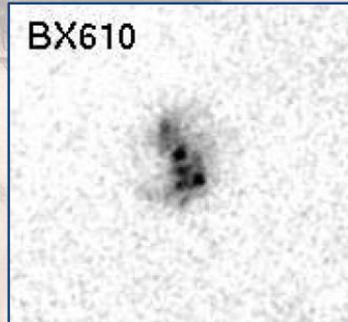
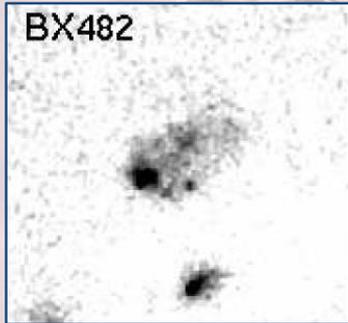
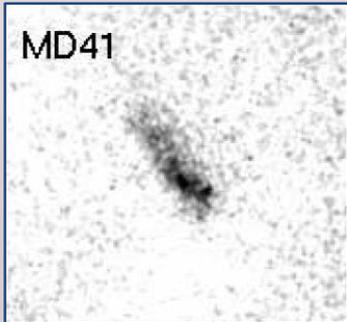
More stars created



Time

Hopkins & Beacom, 2006

Irregular morphologies

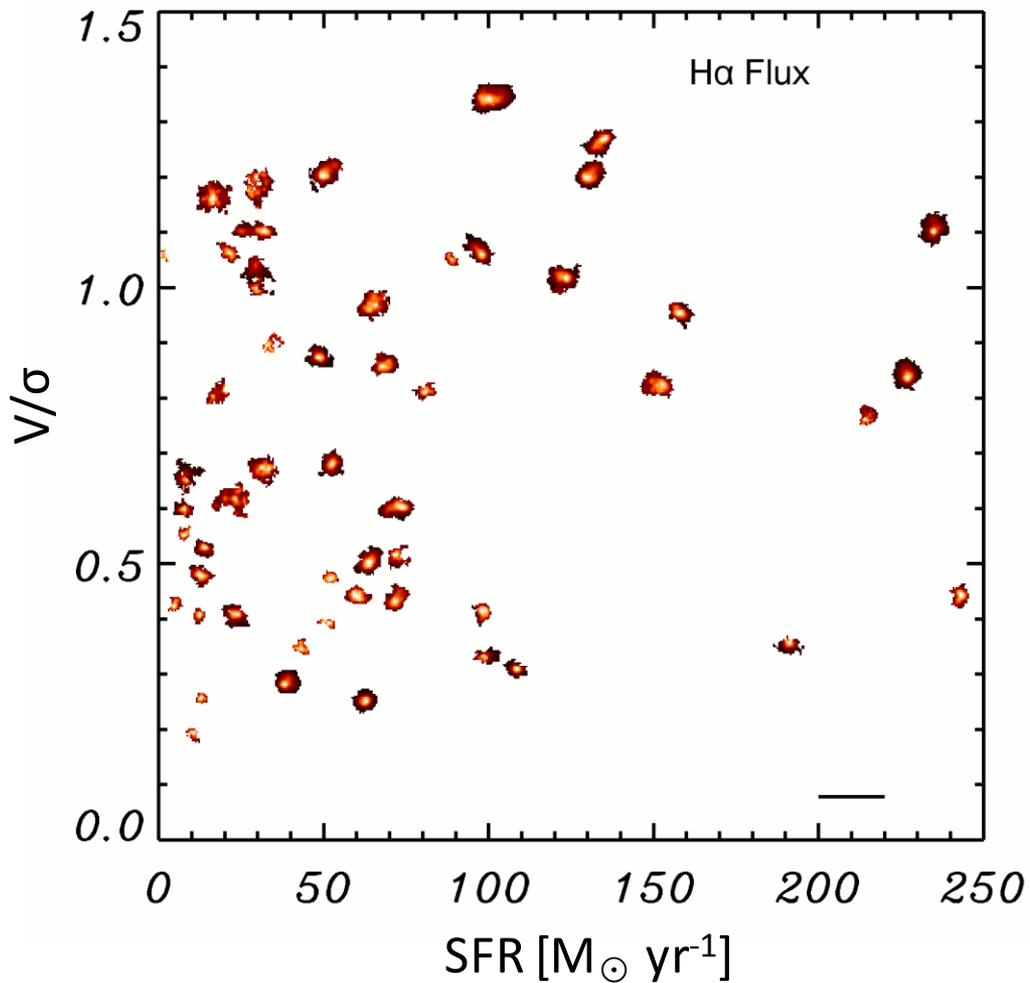


- Morphologies are increasingly irregular towards higher redshifts.
- The covering fraction of star forming regions appears to be high in intensely star forming galaxies.



Put your glasses on Rose,
we're doing
3D spectroscopy!

The sample used for this work



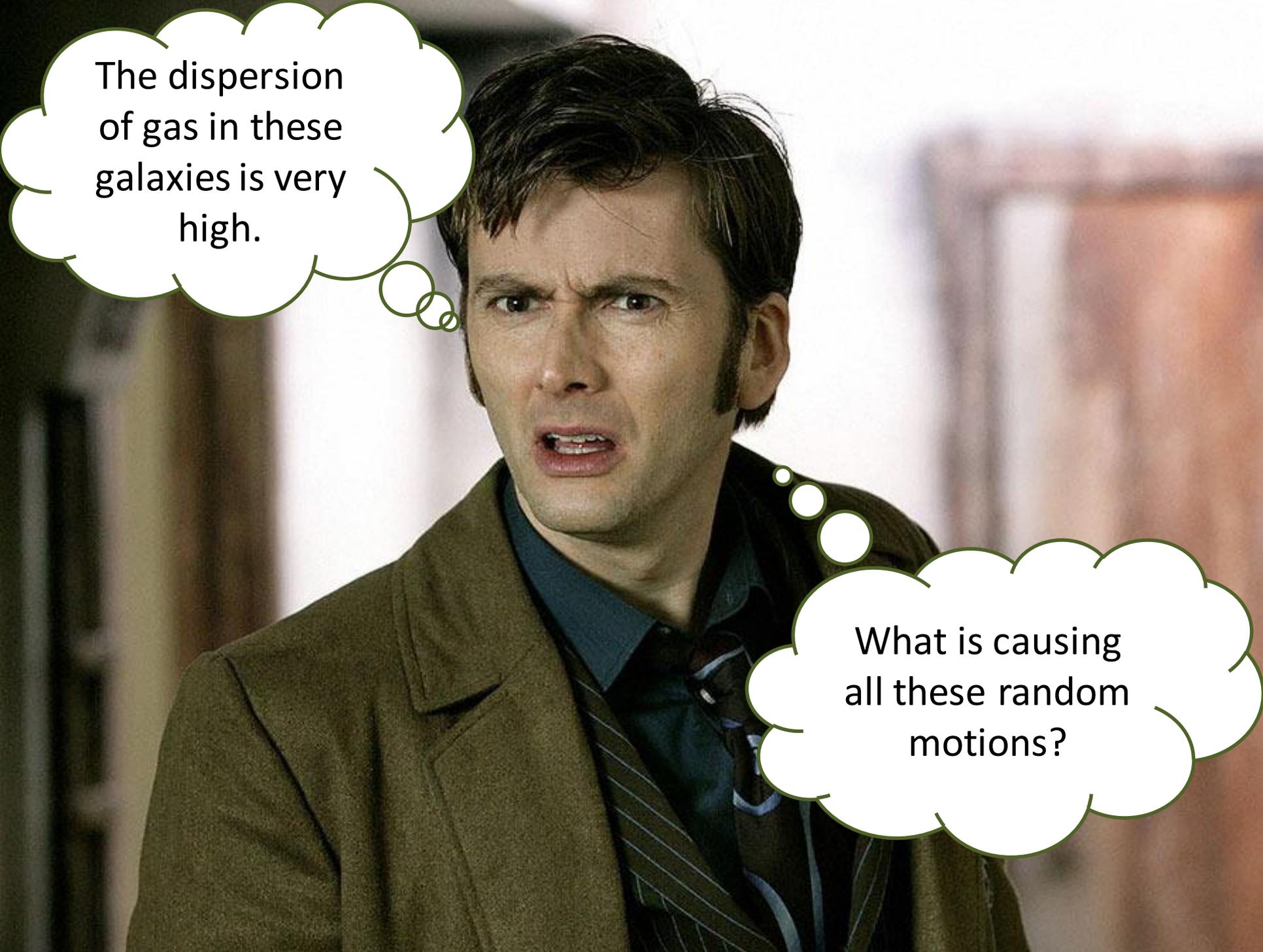
53 galaxies

$1.3 < z < 2.7$

$\langle \text{Area} \rangle \approx 200 \text{ kpc}^2$

$\langle \text{SFR} \rangle \approx 70 M_{\odot} \text{ yr}^{-1}$

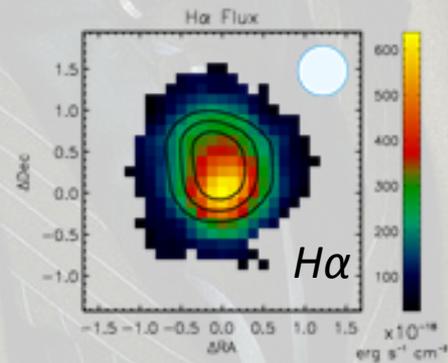
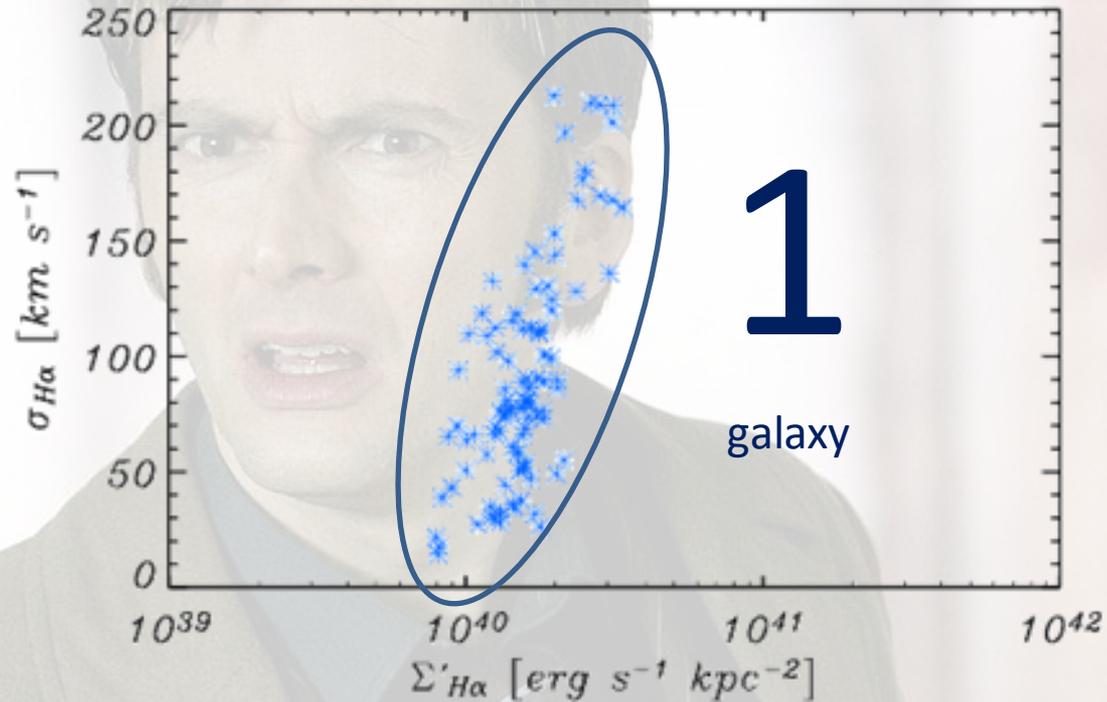
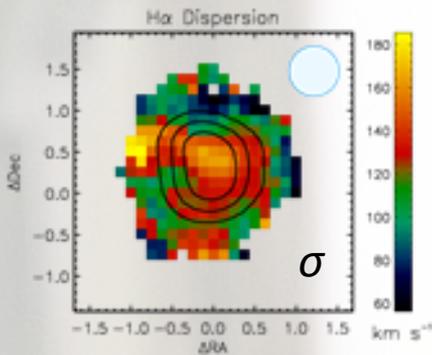
$\langle v/\sigma \rangle \approx 1$

A man with dark hair, wearing a brown jacket over a dark blue shirt and a striped tie, has a confused expression. Two thought bubbles are overlaid on the image. The first bubble is in the top left, and the second is in the bottom right. The background is a blurred indoor setting.

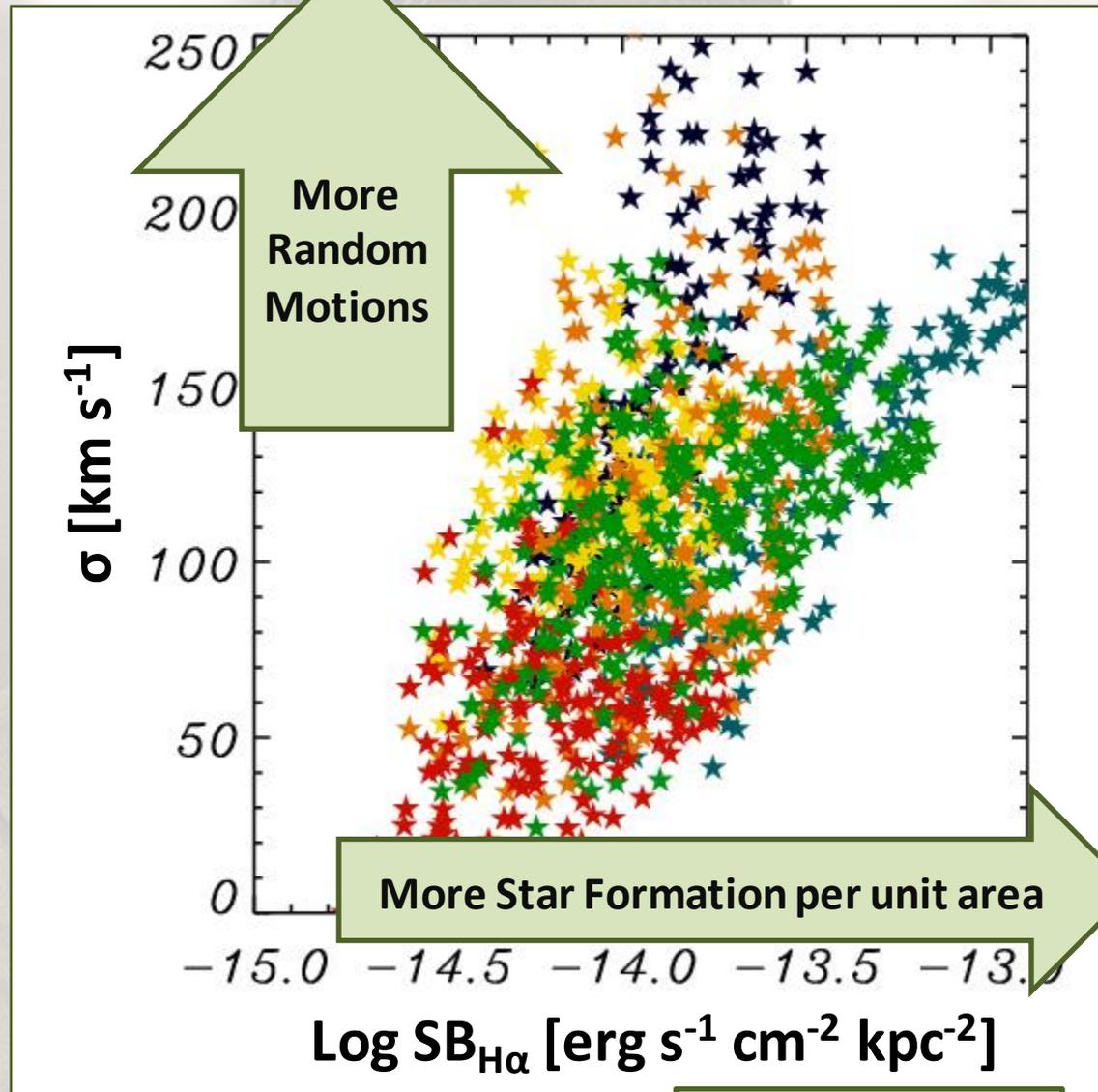
The dispersion
of gas in these
galaxies is very
high.

What is causing
all these random
motions?

Random motions VS H α luminosity

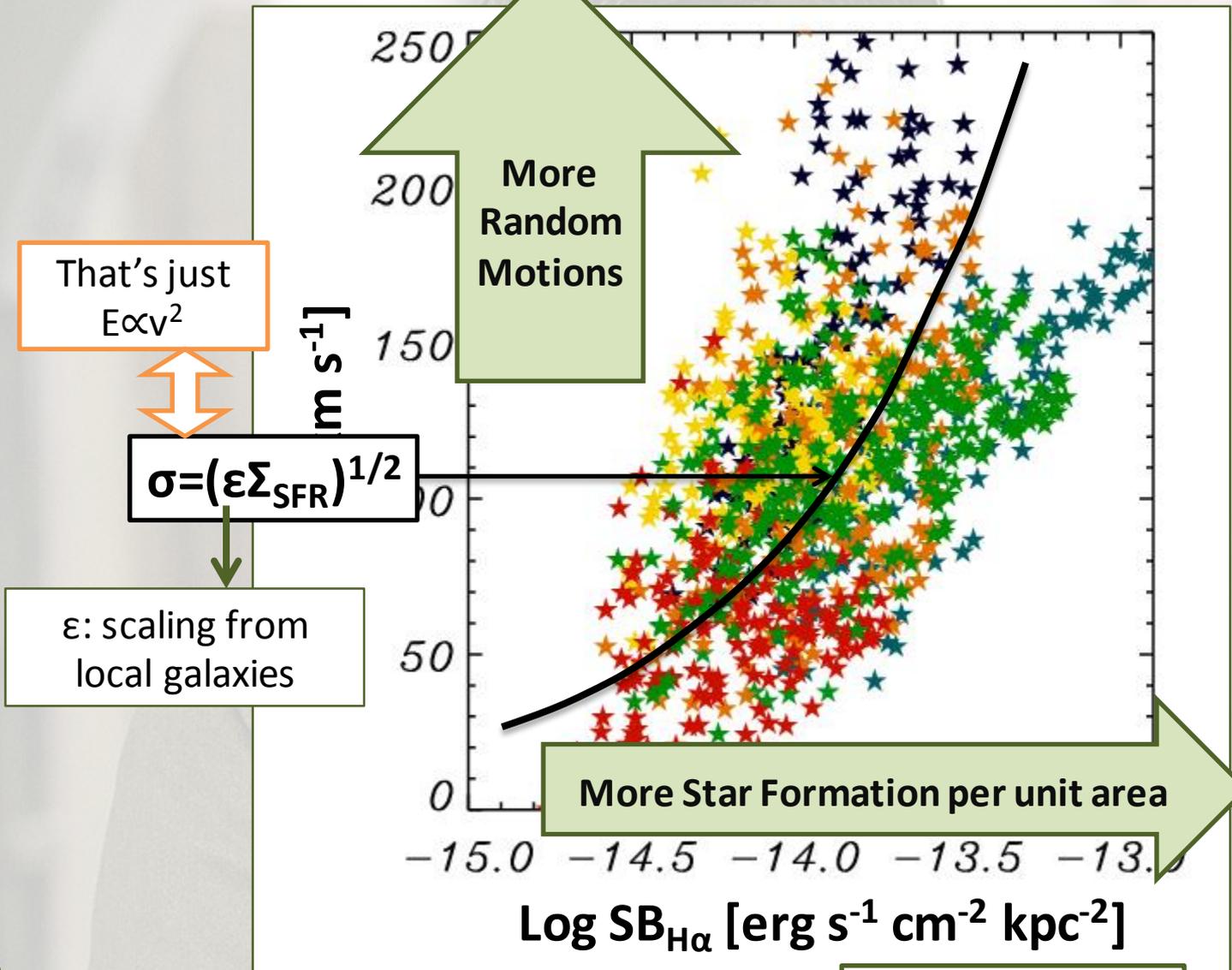


Is there a trend between SFR and H α velocity dispersion?



Lehnert et al. (2009)

Is there a trend between SFR and H α velocity dispersion?



A man and a woman are standing in a museum, looking at a large projection of a star formation on the wall. The woman is on the left, wearing a blue sweater and black pants. The man is on the right, wearing a dark suit. A speech bubble is positioned above them, containing the text: "So do you think these random motions are produced by the intense star formation?".

So do you think these random motions are produced by the intense star formation?

All your praying moments amount to just one breath

What else?



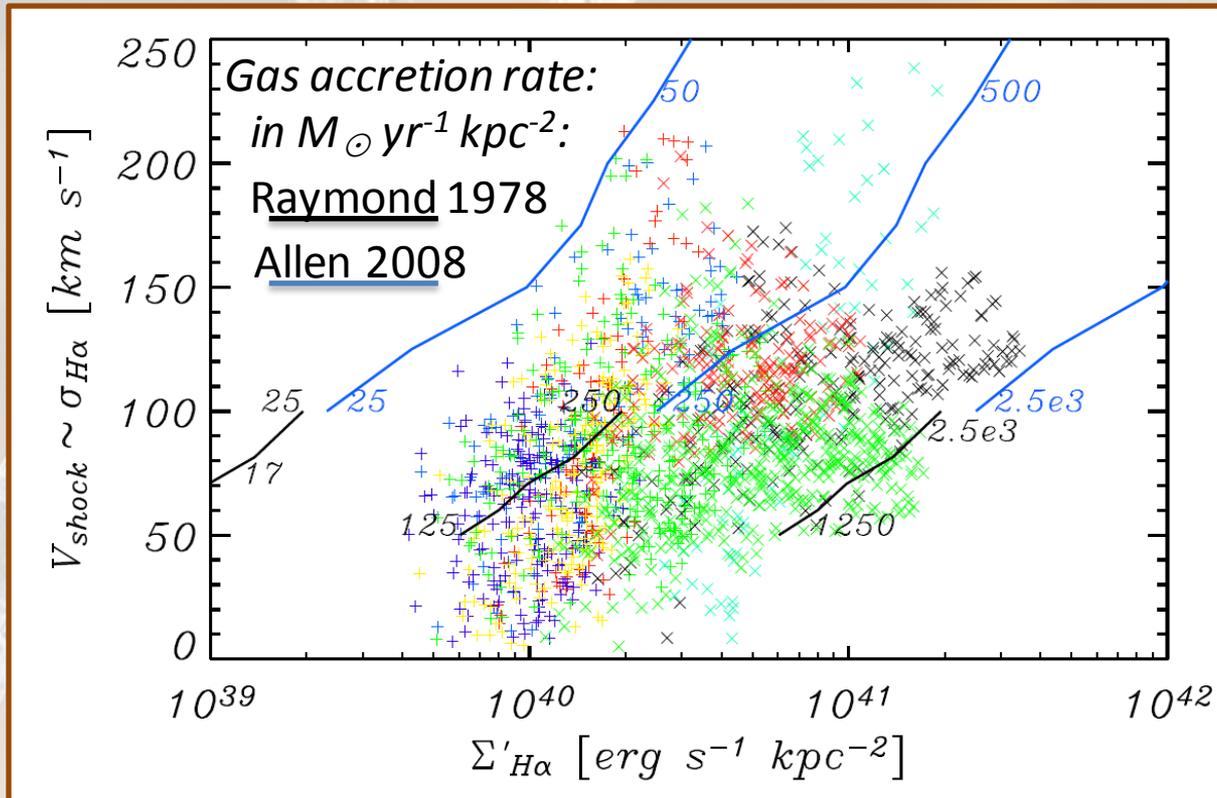
Lehnert+2009,2013, Le Tiran+2011ab



Maybe gas accretion produces these random motions?

Let's check!

What quantity of gas do we need to fuel the H α luminosities?

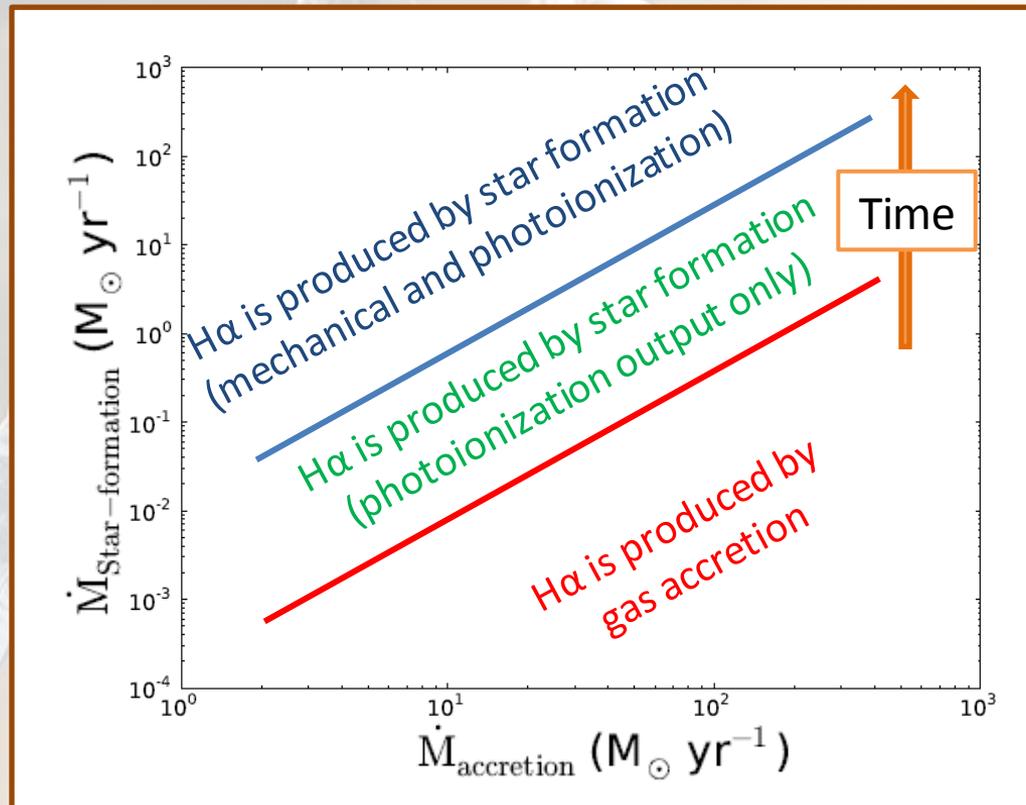


From shock models, we can show that an unrealistic gas accretion rate is needed to power the H α velocity dispersions and luminosities.

What quantity of gas infall do we need to fuel the H α luminosities?

50 000 $M_{\odot} \text{ yr}^{-1}$

Distinguishing between the different contributions of H α luminosity



We can model the different contributions from accretion and star formation. Observing the effect of gas accretion in H α will be difficult.

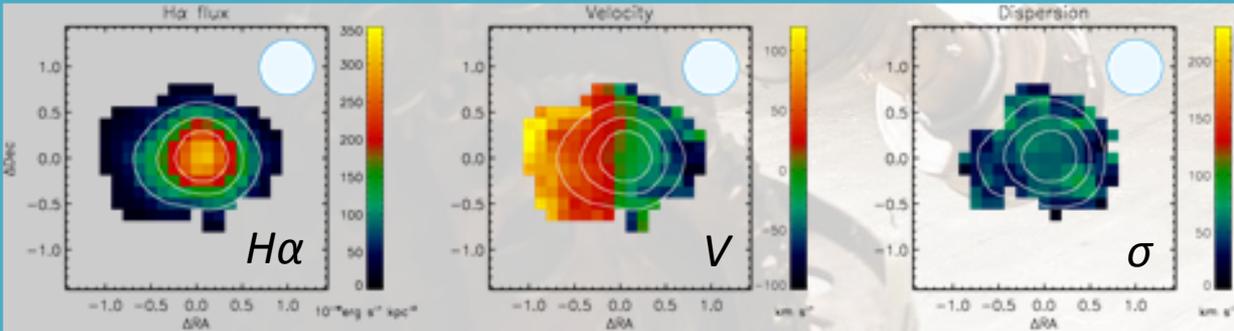
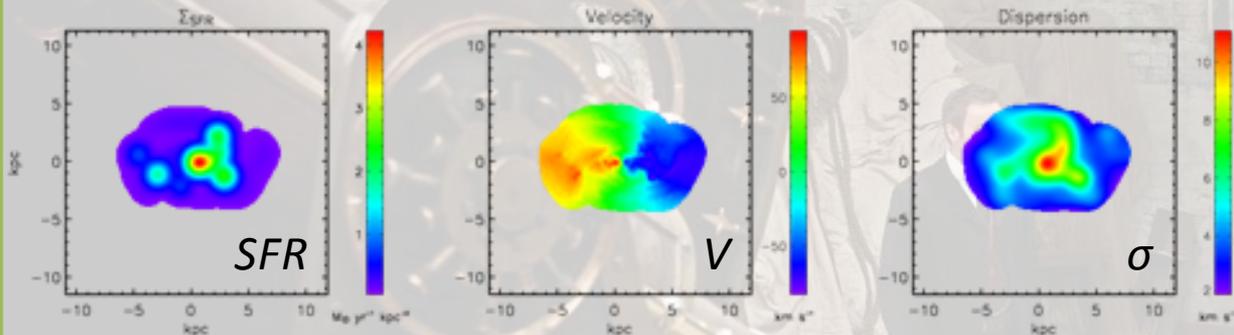


Maybe the large $H\alpha$ linewidths are just an instrumental effect?

Beam smearing? I don't think so. Here's why...

Quantifying the Effects of Beam Smearing

N-body/SPH Simulation (Di Matteo, Bournaud et al. 2008)

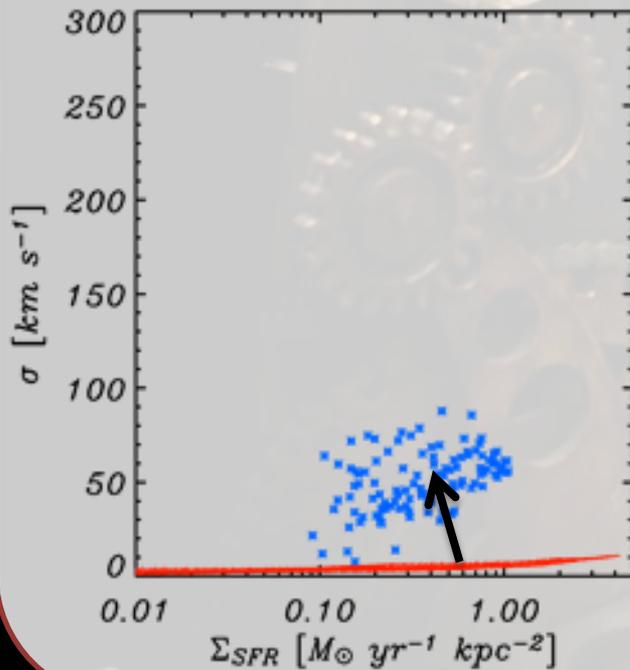
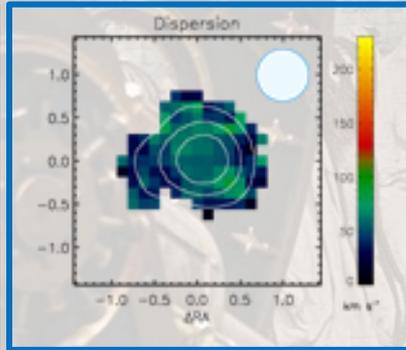
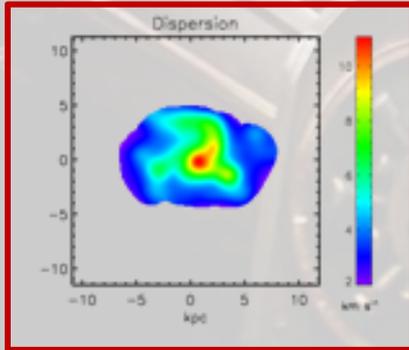


Virtual observation

We can use simulated “clumpy disks” and analog them to a virtual SINFONI observation, in order to study the importance of beam smearing

Quantifying the Effects of Beam Smearing

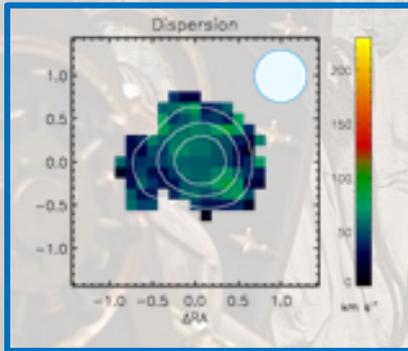
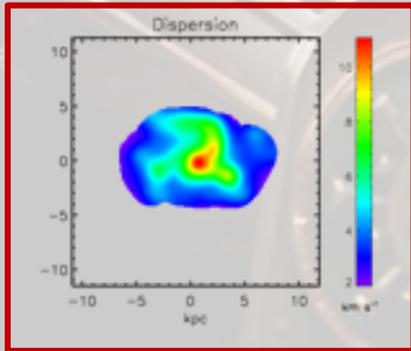
gravitational dispersion



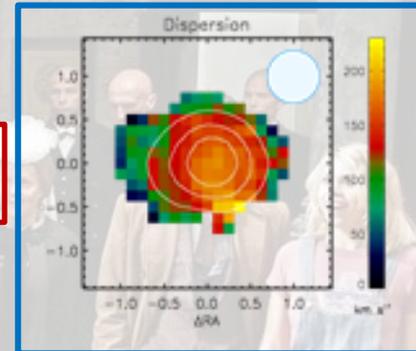
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Quantifying the Effects of Beam Smearing

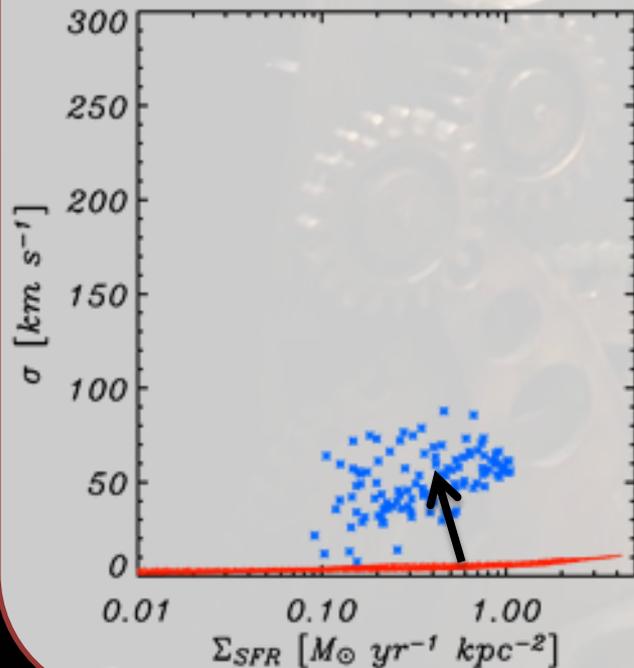
gravitational dispersion



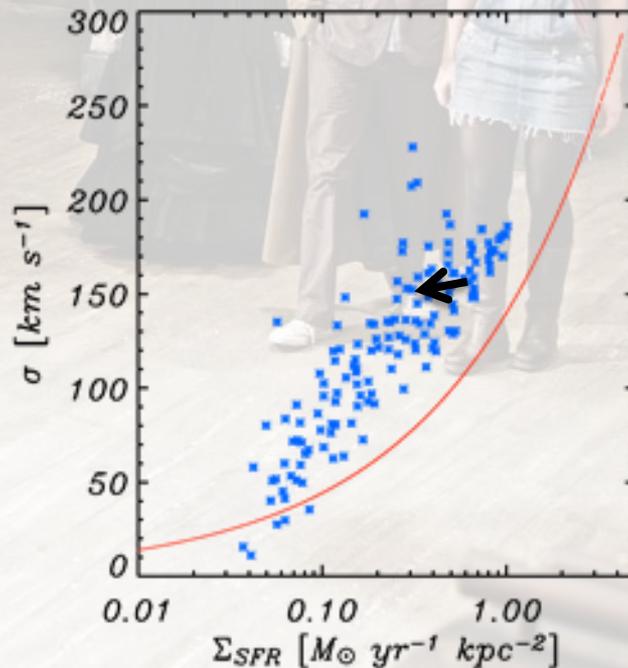
analytic dispersion



$$\sigma = (\epsilon \Sigma_{\text{SFR}})^{1/2}$$



We can use simulated “clumpy disks” and analog them to a virtual SINFONI observation, in order to study the importance of beam smearing





\$1 Million



What is stirring up the gas?

A: Gas accretion

B: An instrumental effect

C: Star formation

D: The moon



Últimas notícias Premiê transformou Cingapura de ilha sem recursos a centro financeiro



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De onde viemos, onde estamos e para onde vamos



Perfil

Salvador Nogueira é jornalista de ciência e autor de oito livros.

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POR SALVADOR NOGUEIRA

19/03/15 18:49

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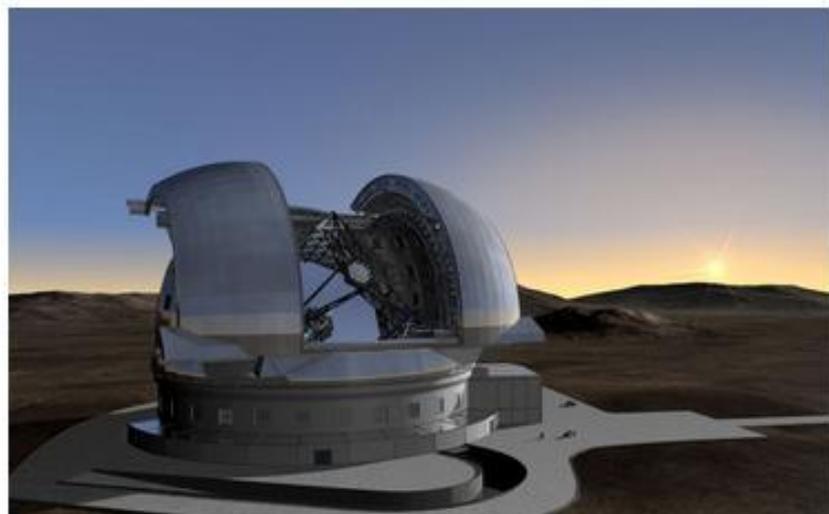
Twitter

68

3

OUVR O TEXTO

Depois de algumas **idas** e **vindas** que causaram comoção na comunidade astronômica, o acordo de adesão do Brasil ao ESO (Observatório Europeu do Sul) foi aprovado nesta quinta-feira (19) pelo Plenário da Câmara dos Deputados.



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