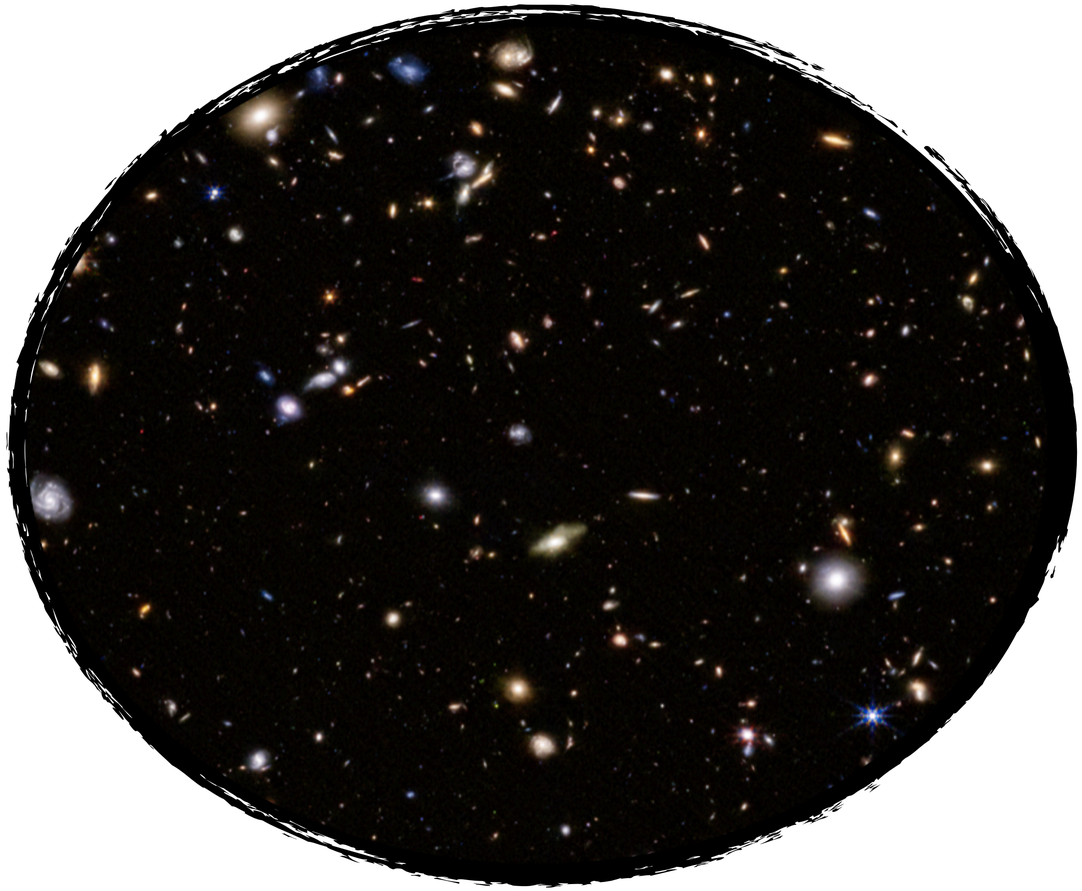
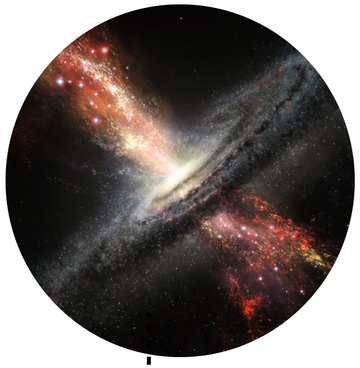


Laure Ciesla

Laboratoire d'Astrophysique de Marseille

My journey



Aix*Marseille université
Socialement engagée

2009-2012

UNIVERSITY OF CRETE

2013-2015

cea

2015-2017

LAM
LABORATOIRE D'ASTROPHYSIQUE DE MARSEILLE

2018 —

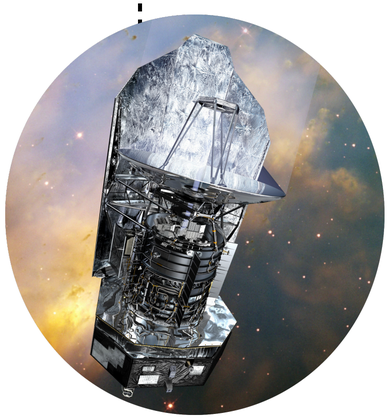
cnes

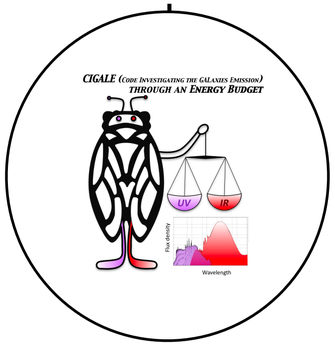
cnrs

Histoire de Formation Stellaire des galaxies

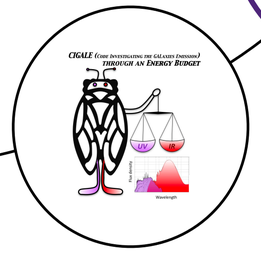
BOBAFET
cnrs
MITI
MISSION INTERDISCIPLINAIRE POUR LES INITIATIVES TRANSVERSES INTERDISCIPLINAIRE

CEERS



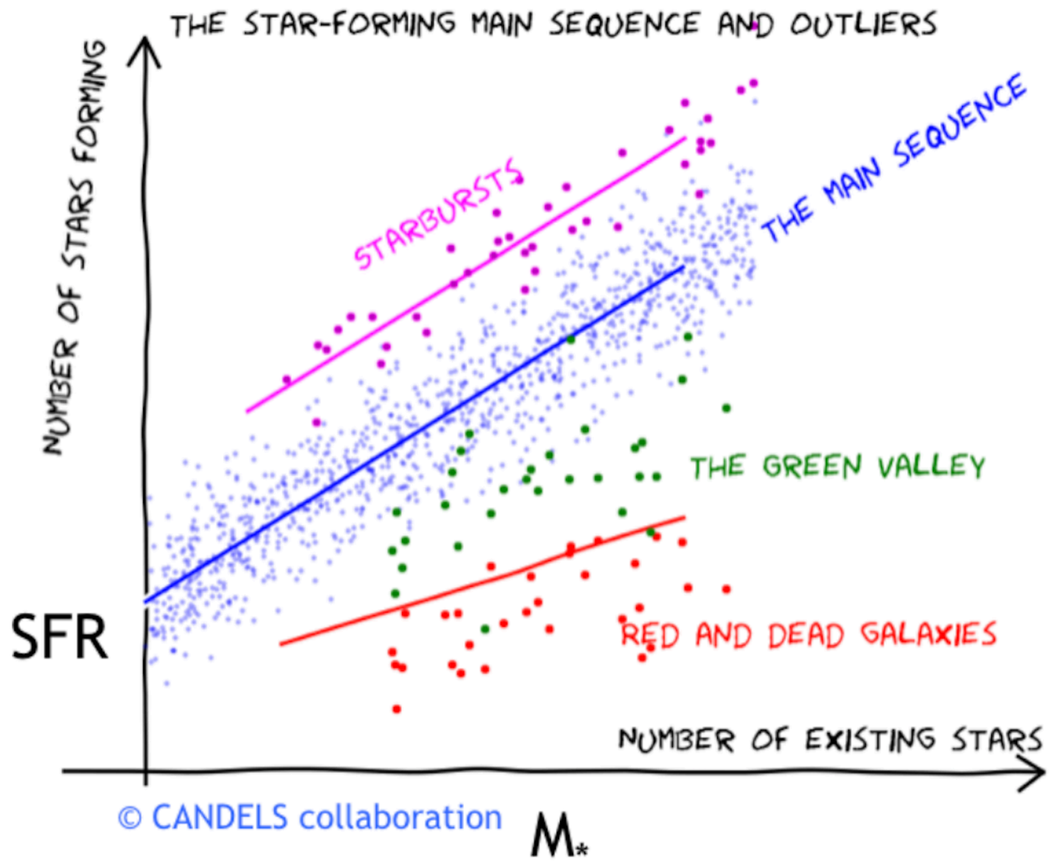


PRIMA



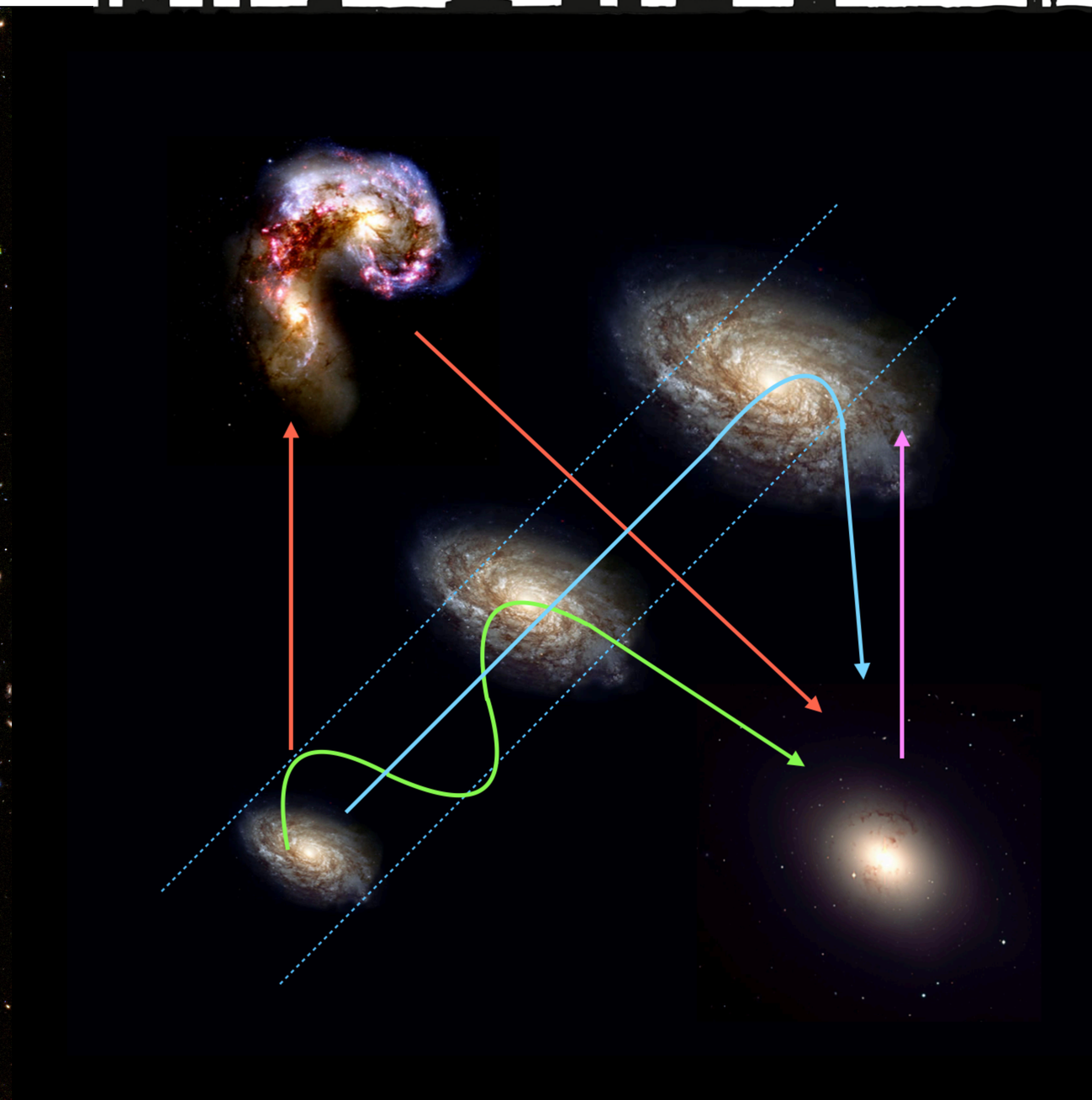
Galaxies star-forming main sequence

JWST Ultra Deep Field



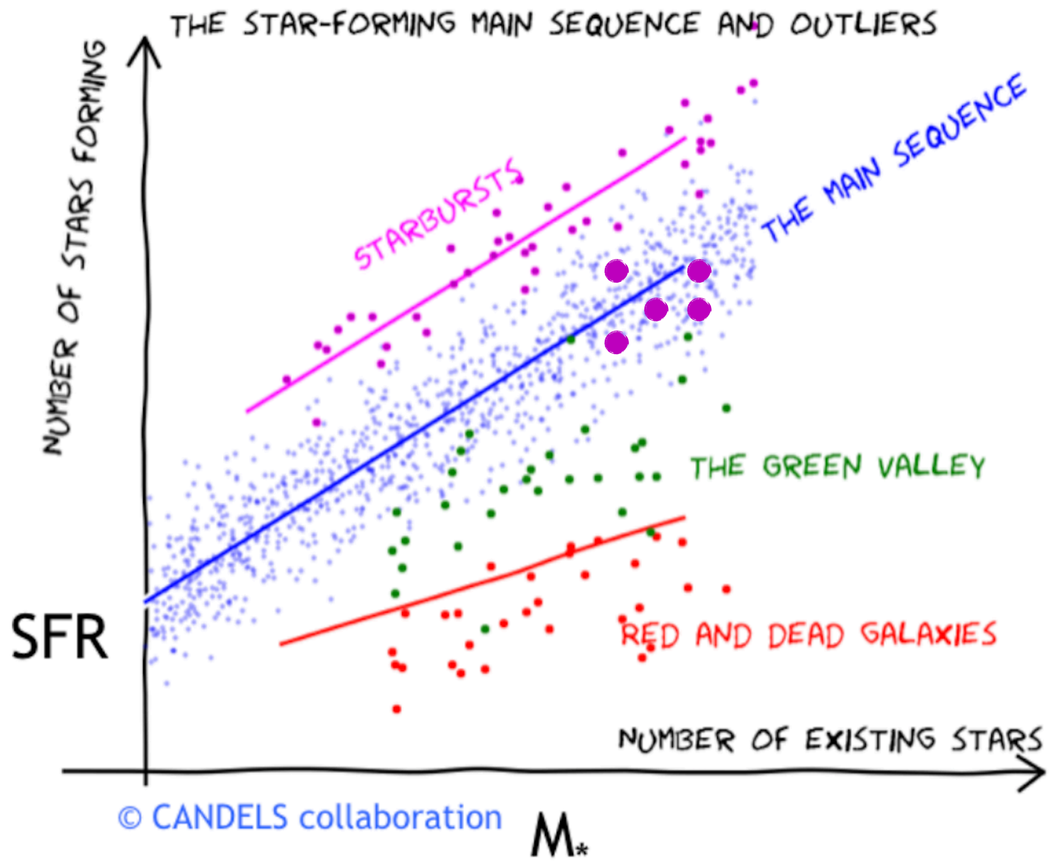
Noeske et al. 2007, Elbaz et al. 2007, Elbaz et al. 2011, Speagle et al. 2014, Schreiber et al. 2014, etc…

Galaxies star-forming main sequence



Galaxies star-forming main sequence

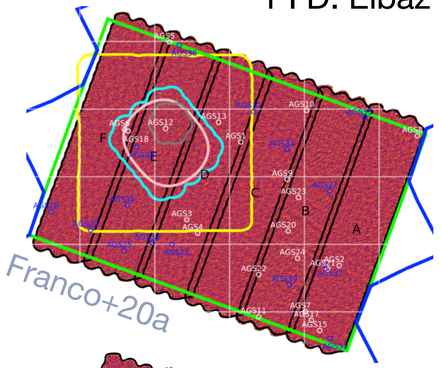
JWST Ultra Deep Field

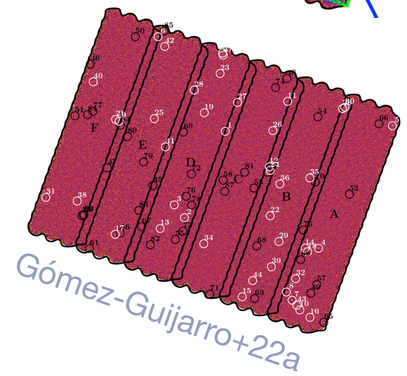


Elbaz+18; Gomez-Guijarro+22b

Recent SFH of GOODS-ALMA galaxies

PI D. Elbaz — 1.1mm ALMA galaxy survey in GOODS-South — Area ~70 arcmin² in two resolutions — 88 sources

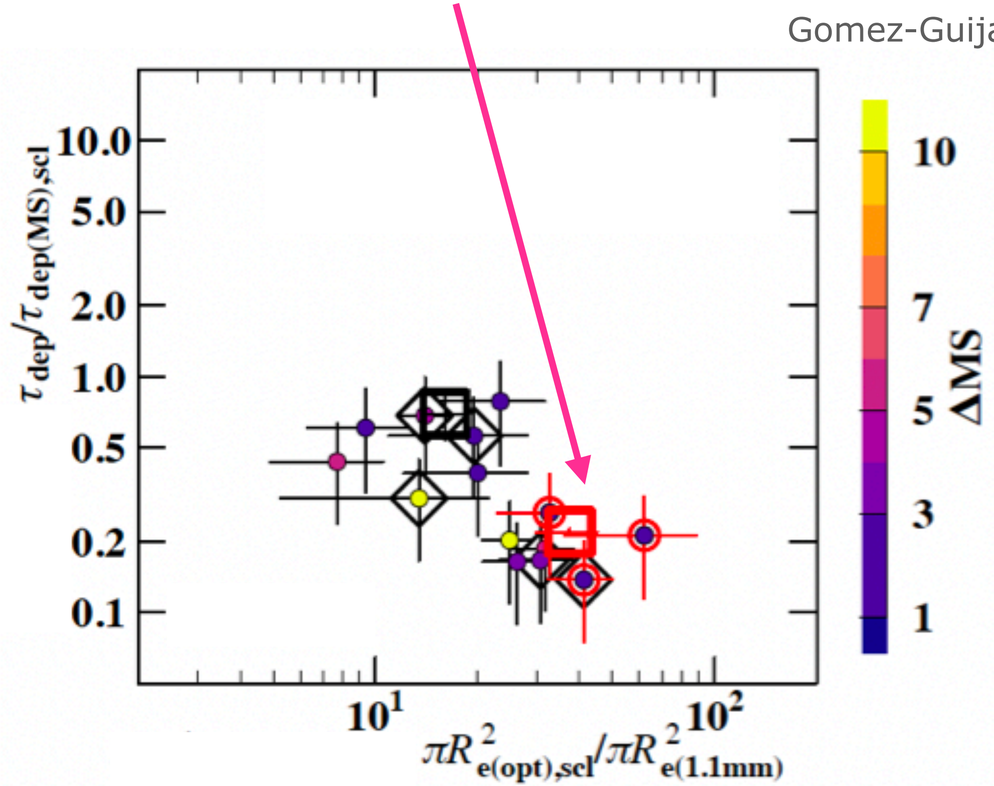




- Within the MS
- Very Massive
- Very compact (FIR)
- Low depletion time
- Low gas fraction
- High dust temperature

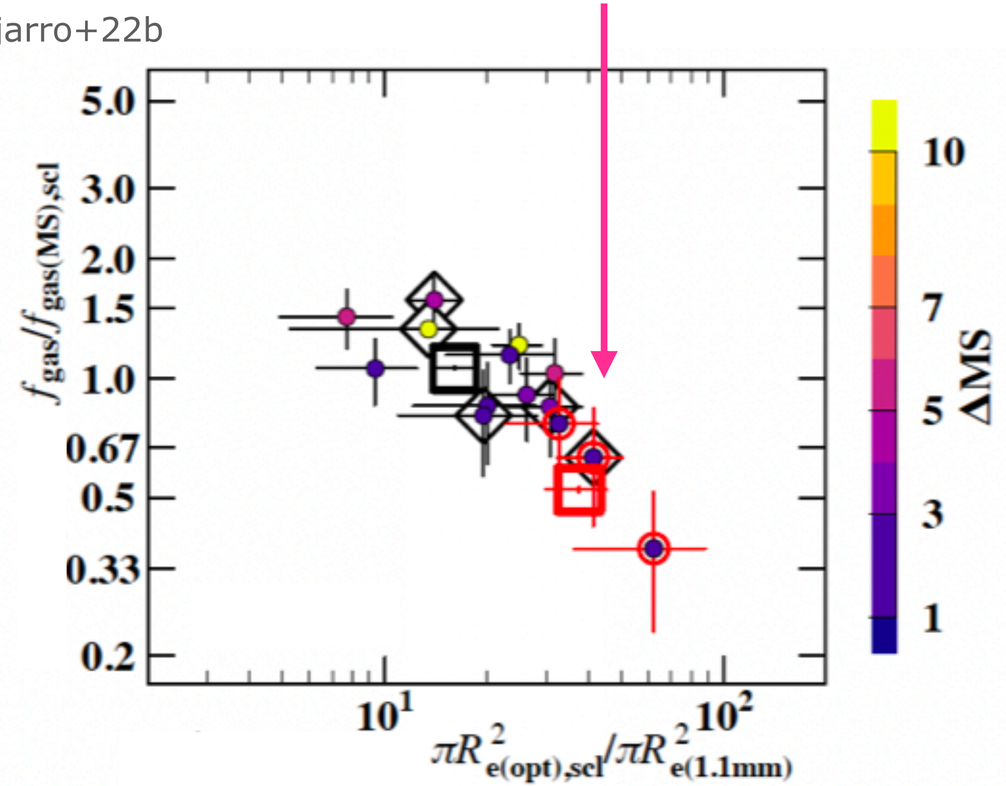
Low gas depletion time

Gomez-Guijarro+22b



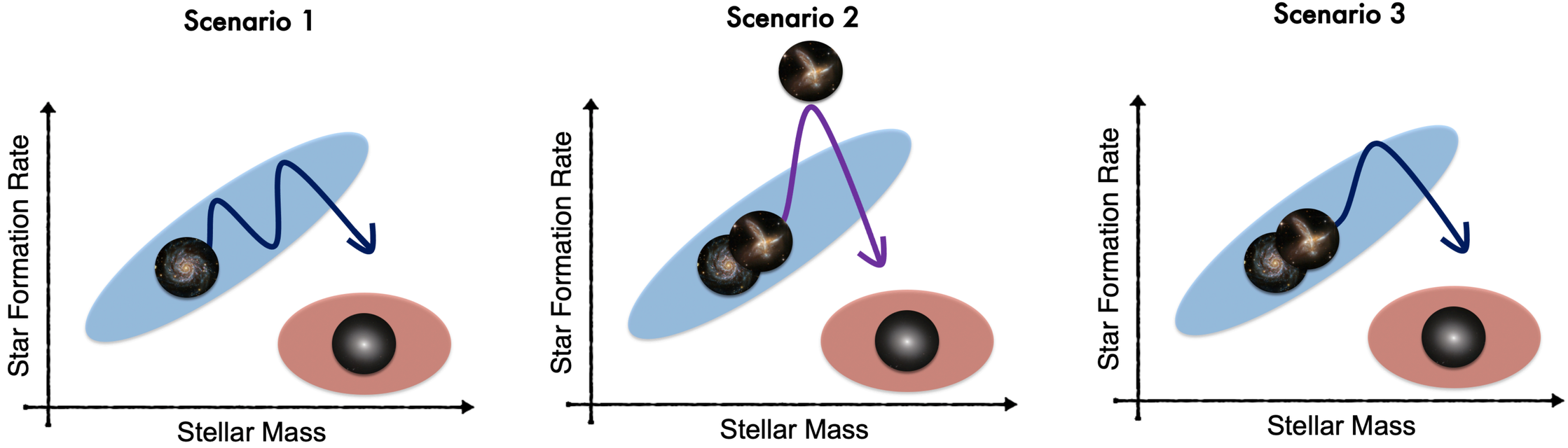
Compactness

Low gas fraction



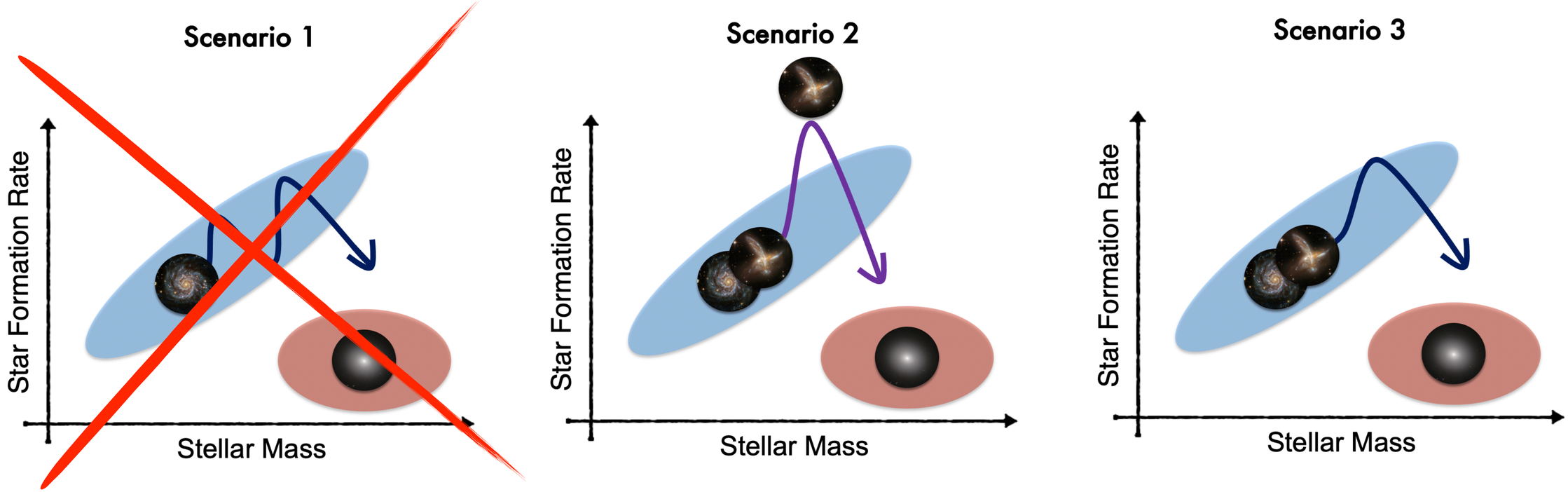
Compactness

Recent SFH of GOODS-ALMA galaxies



Gomez-Guijarro+22b

Recent SFH of GOODS-ALMA galaxies



Not matching in terms of morphology

Can we say something about Scenario 2 and 3?

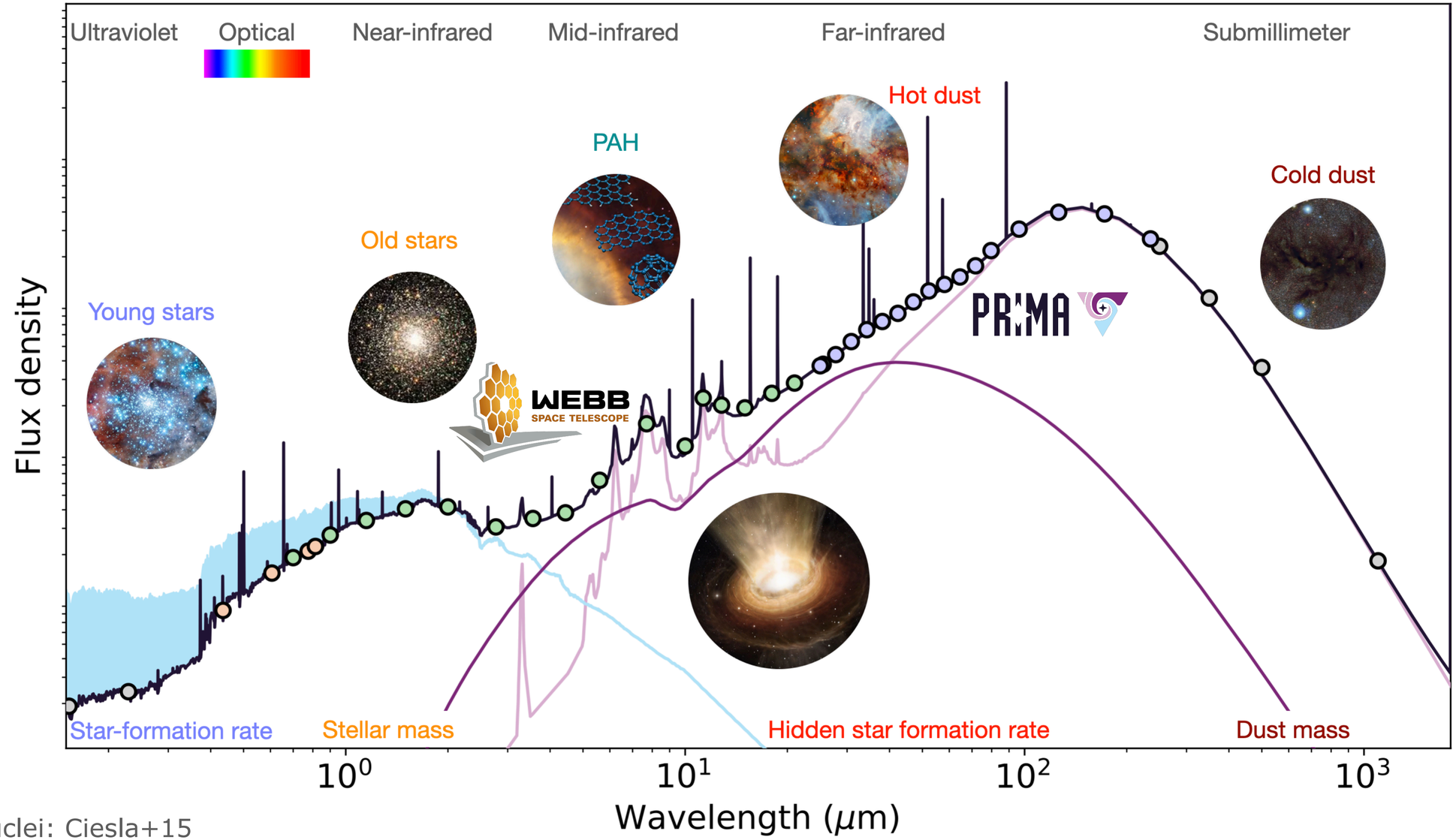
Gomez-Guijarro+22b

Working tool: CIGALE

cigale.lam.fr Boquien et al. 2019

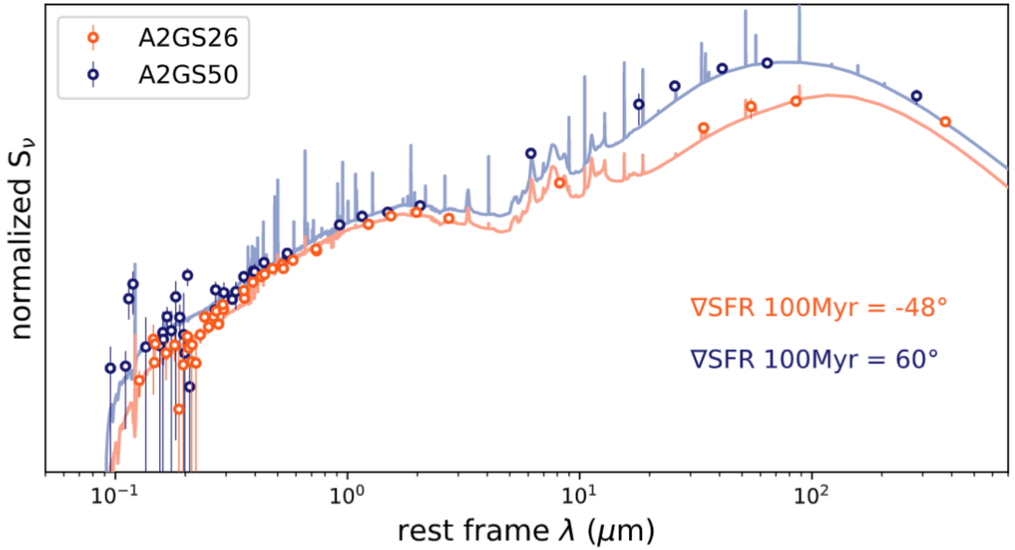
M. Boquien, D. Burgarella, Y. Roehlly, V. Buat, L. Ciesla, G. Yang, K. Malek

LAM LABORATOIRE D'ASTROPHYSIQUE DE MARSEILLE

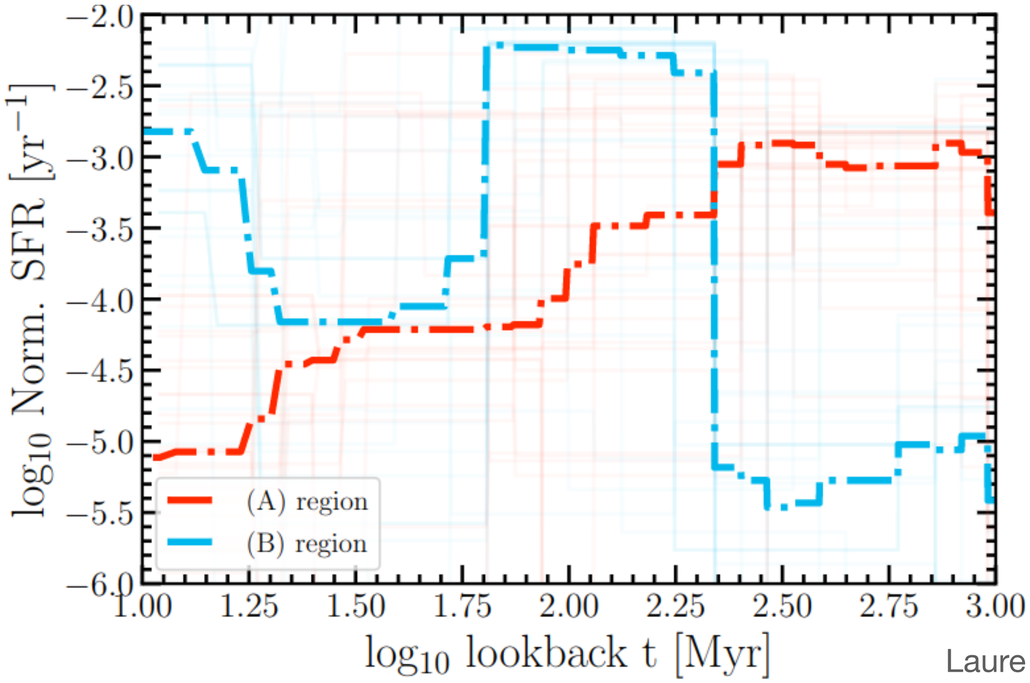


Active Galactic Nuclei: Ciesla+15
Star formation history: Ciesla+16, Ciesla+23

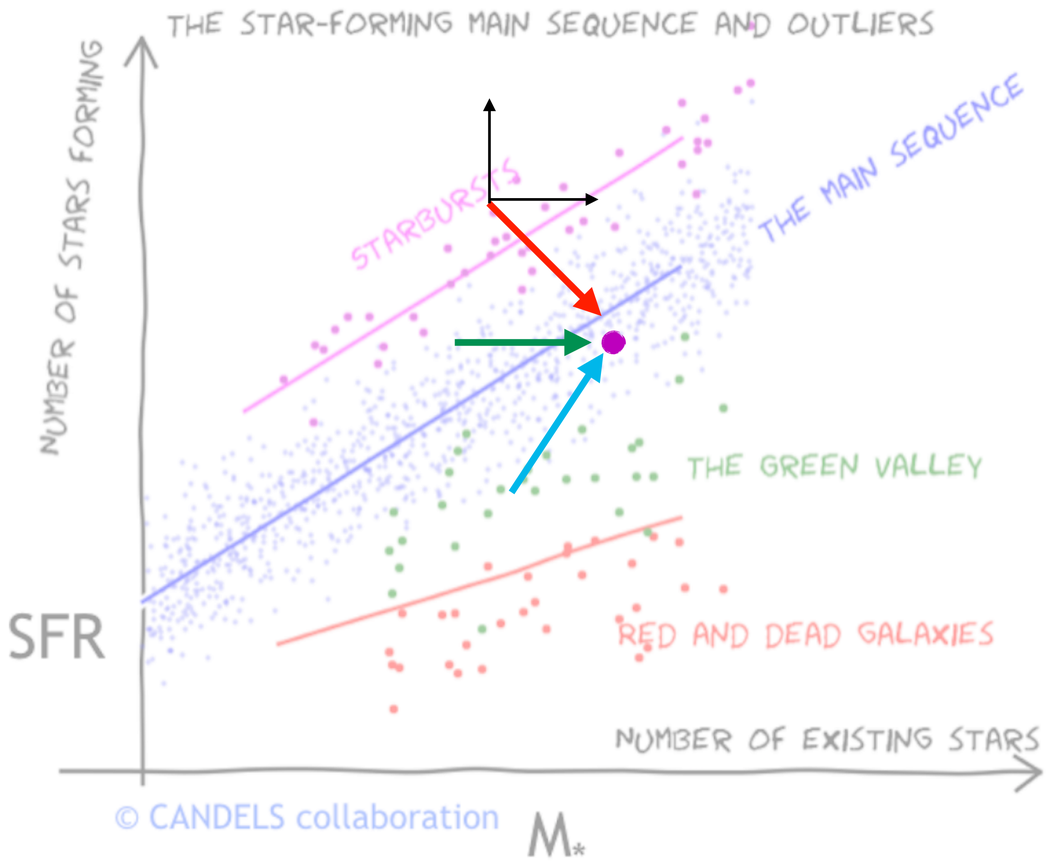
Measuring galaxies' mouvement on the MS



Ciesla+23

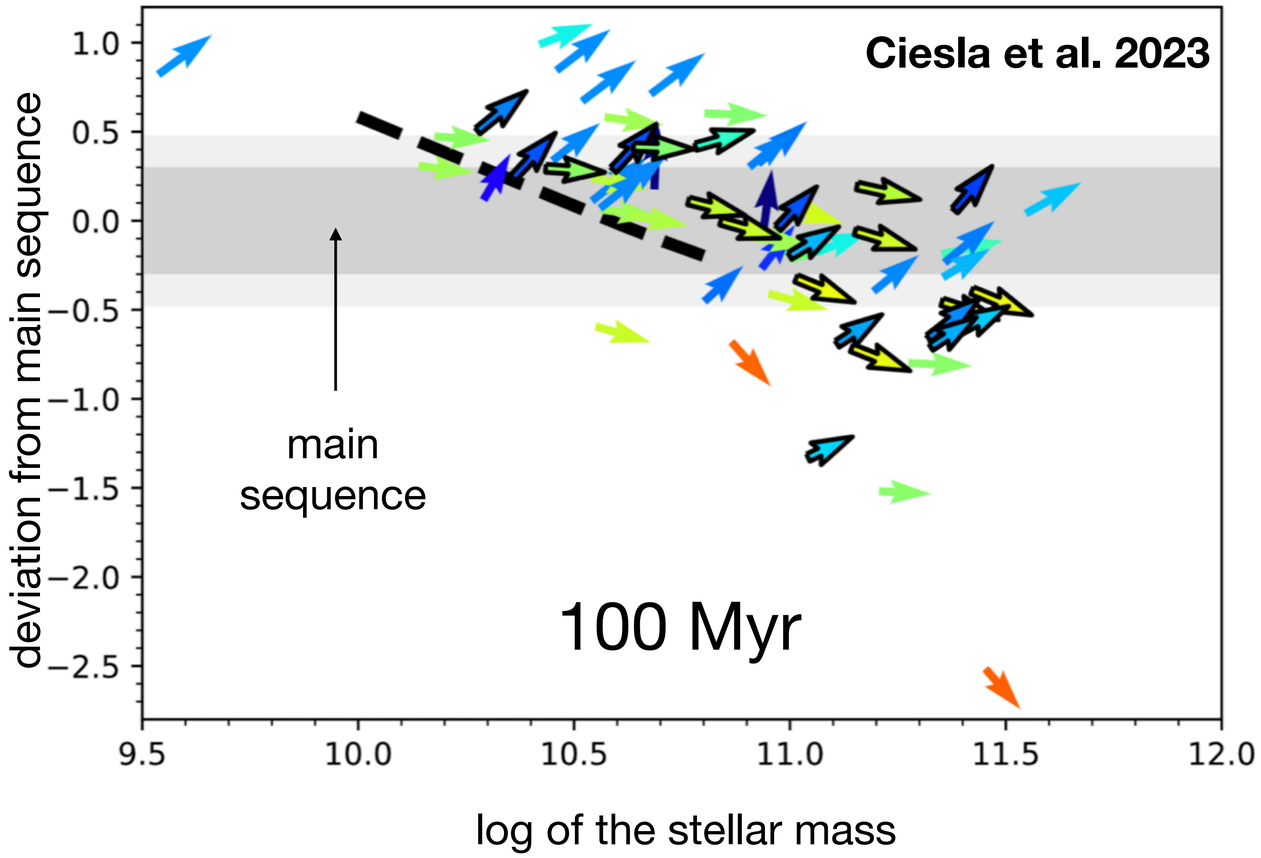


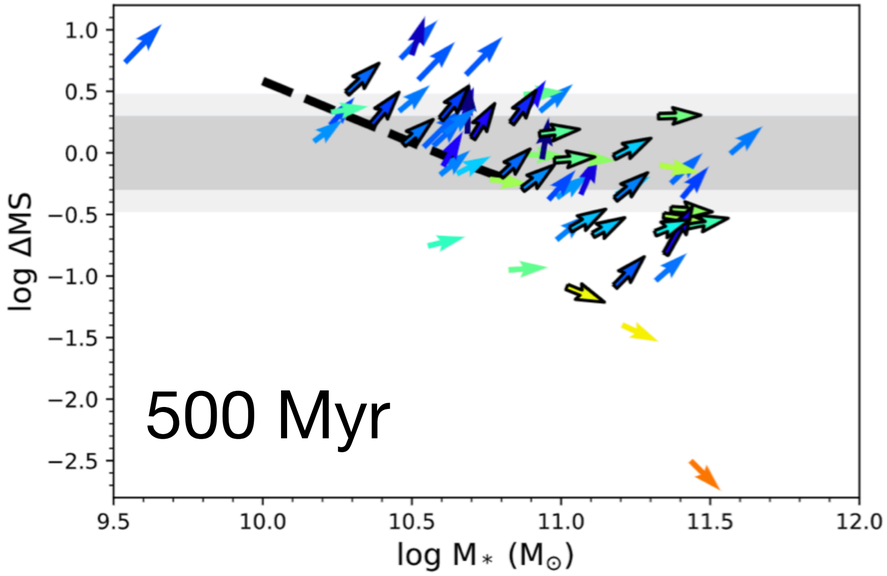
Arango-Toro+23

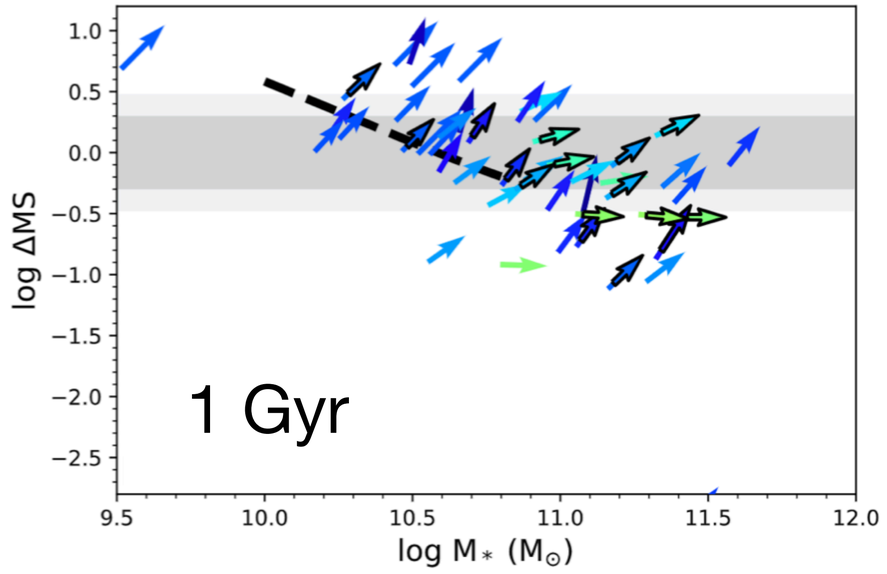


SFR gradient is an angle on the SFR-M_* plane, estimated as any other parameter with CIGALE

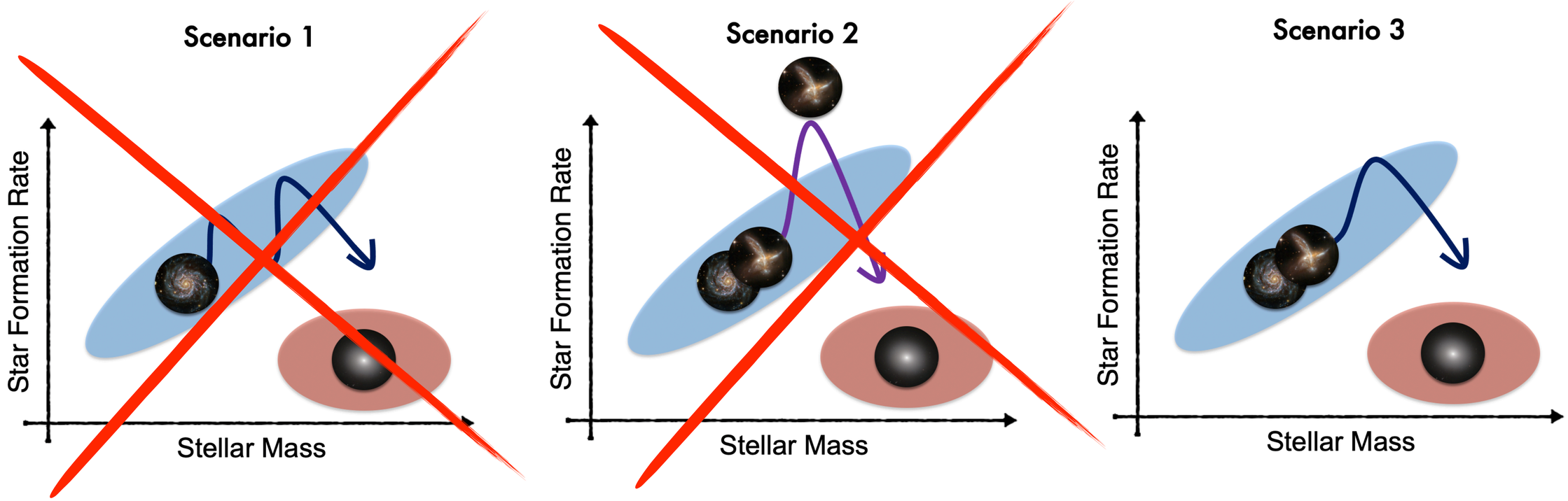
GOODS-ALMA galaxies recent star formation histories







GOODS-ALMA galaxies recent star formation histories



Not matching in terms of morphology

Not matching in terms of SFH

The good one?

SFR sustained in very massive SFGs, keeping them within the MS, gas fractions are low, they are presumably on their way to quiescence. Points to a self-regulation mechanism. Gas and star formation compression seem to hold their SFR.

Gomez-Guijarro+22b, Ciesla+23

BOBAFET: statistics & machine learning for SFH constraints

Booster Bayesian pour la formation des étoiles

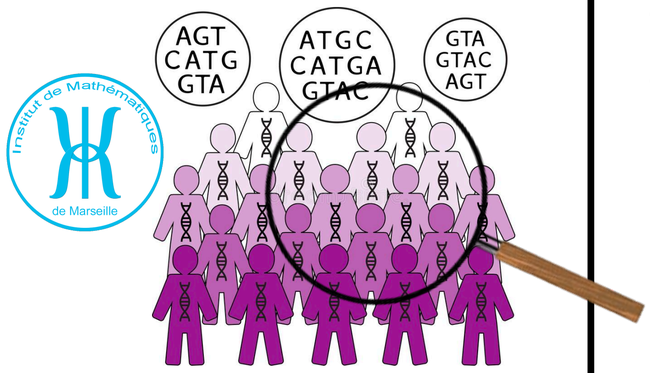
Understand which mechanism rapidly quench star formation

↓

Pinpoint the mechanism at play by identifying galaxies that are rapidly quenching

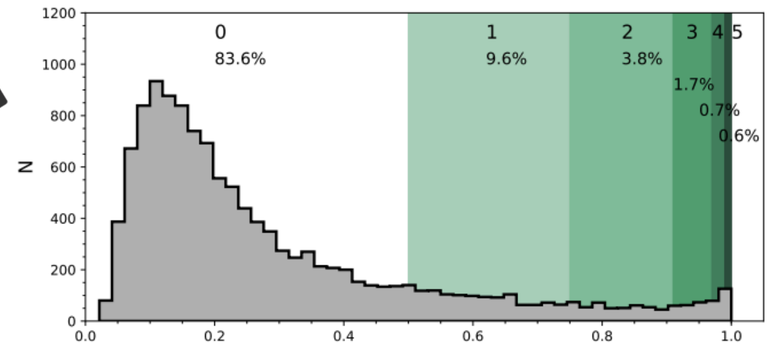
— the smoking gun

Combine **statistics** and **machine learning**



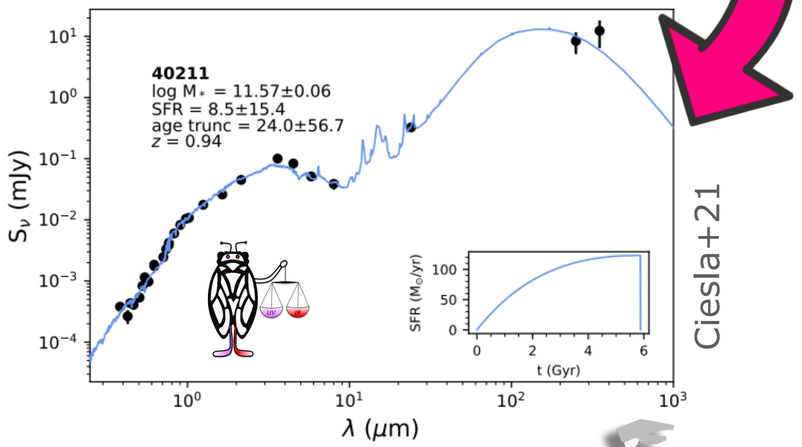
developed in

genetics of populations



\+ More accurate!

\+ Faster!



MITI CNES/CNRS 2022-2023

PIs: Ciesla (LAM), Pudlo (I2M)

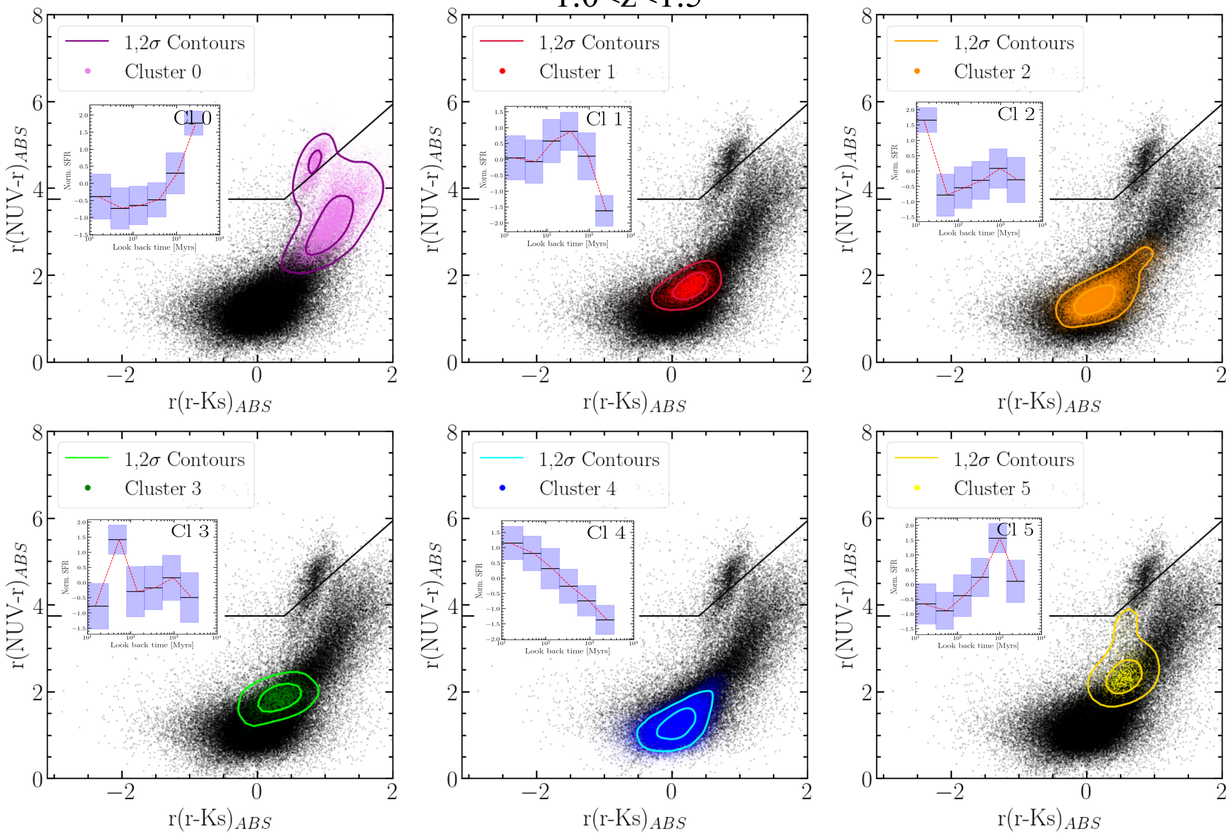
New projects resulting from the BOBAFET impulse

Star formation histories classification using neural network.

Trained on Hz-AGN simulation

Applied on COSMOS galaxies

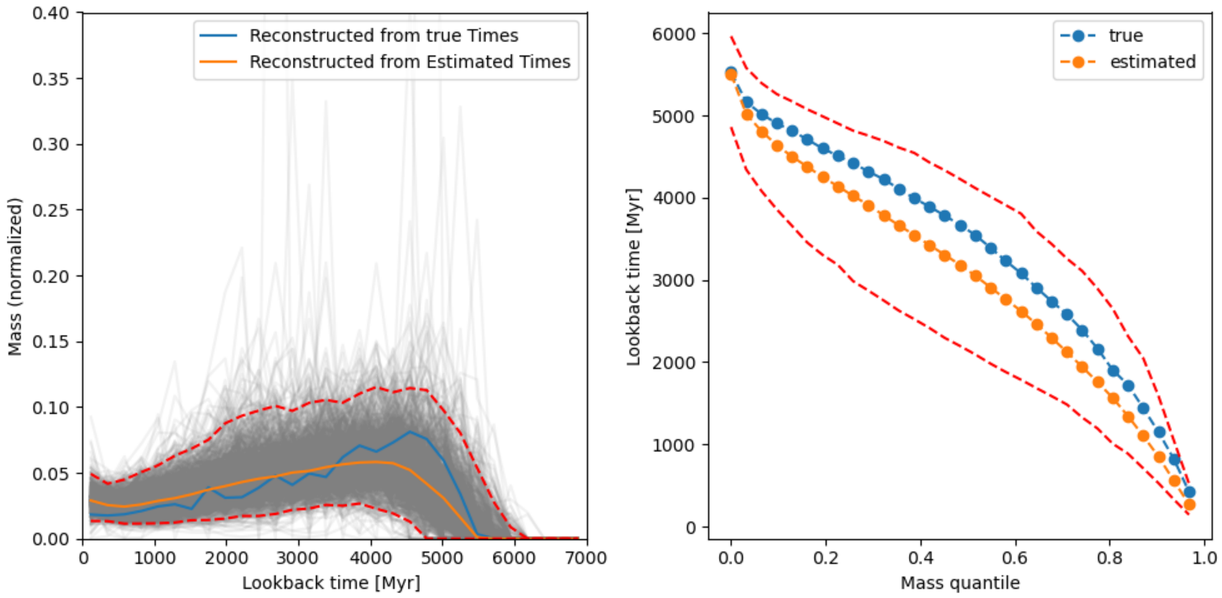
1.0<z<1.5



Arango-Toro+ in prep
PhD student at LAM

Star formation history reconstruction directly from fluxes

Trained on Hz-AGN



Aufort+ in prep
Postdoc at IAP

First selection 2024

Final selection 2025

Launch 2030

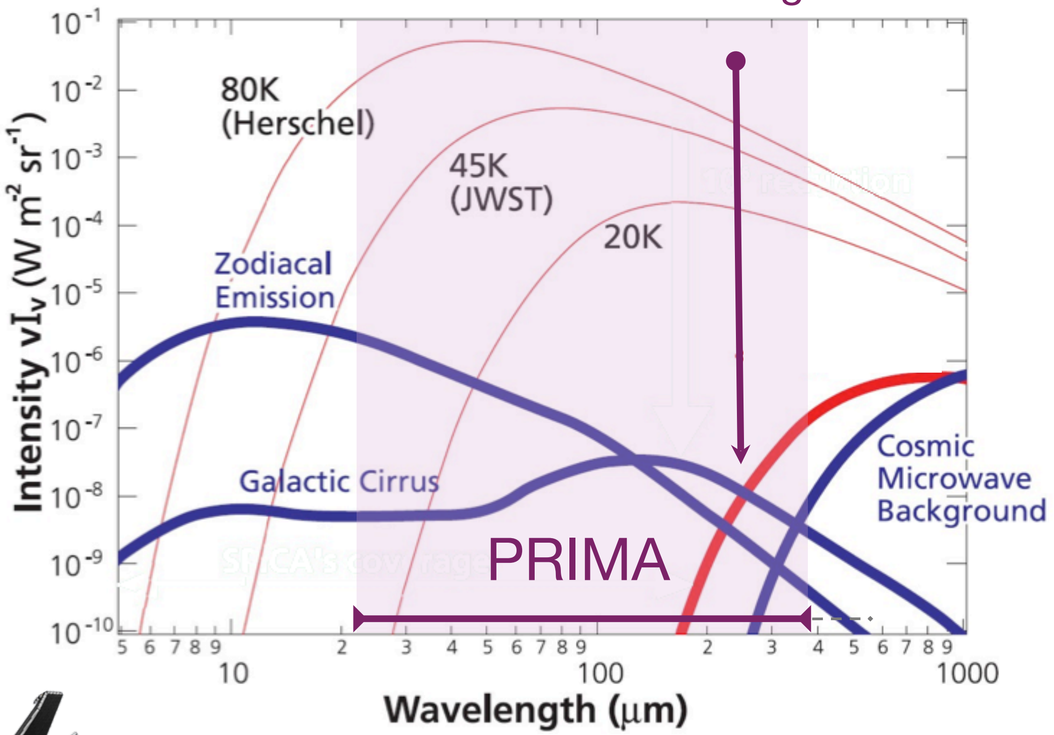
Payload	
Instruments	
Telescope	2.0 m all-aluminum on-axis telescope, cooled to 4.5 K
Spectrometer	4 gratings, small-volume KIDs, 100 mK, 24-240 μm, R = 130
FTS	High resolution mode: R = 4,400 @ 112 μm
Imager	PRIMAGER - 100mK, 25-264 μm, narrow short-wave bands
Active / Passive Thermal	
Active	Cryocooler & ADR for the focal planes
Passive	V-groove radiators & sun-shade

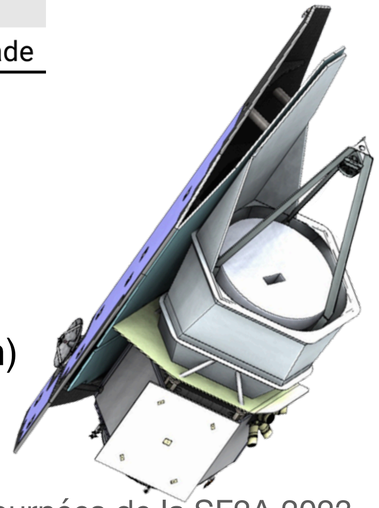
Broadband spectroscopy and fast spectral mapping

High resolution spectroscopy of point sources

Fast R ~ 10 imaging ($25 \leq \lambda \leq 80\ \mu$m) and broadband polarimetry ($80 \leq \lambda \leq 265\ \mu m$)

10^6 reduction in background!





Ratio between the 20% **darkest nights at Mauna Kea** and **day light** in V-band is about **30 millions**.

Principal Investigator: **Jason Glenn** (GSFC)

Co-PI: **Margaret Meixner** (JPL)

Project Scientists: **C. Matt Bradford** & **Klaus Pontoppidan** (JPL/Caltech)

Science Lead: **Alexandra Pope** (University of Massachusetts)

First selection 2024

Final selection 2025

Launch 2030

Payload

Broadband spectroscopy and fast spectral mapping

High resolution spectroscopy of point sources

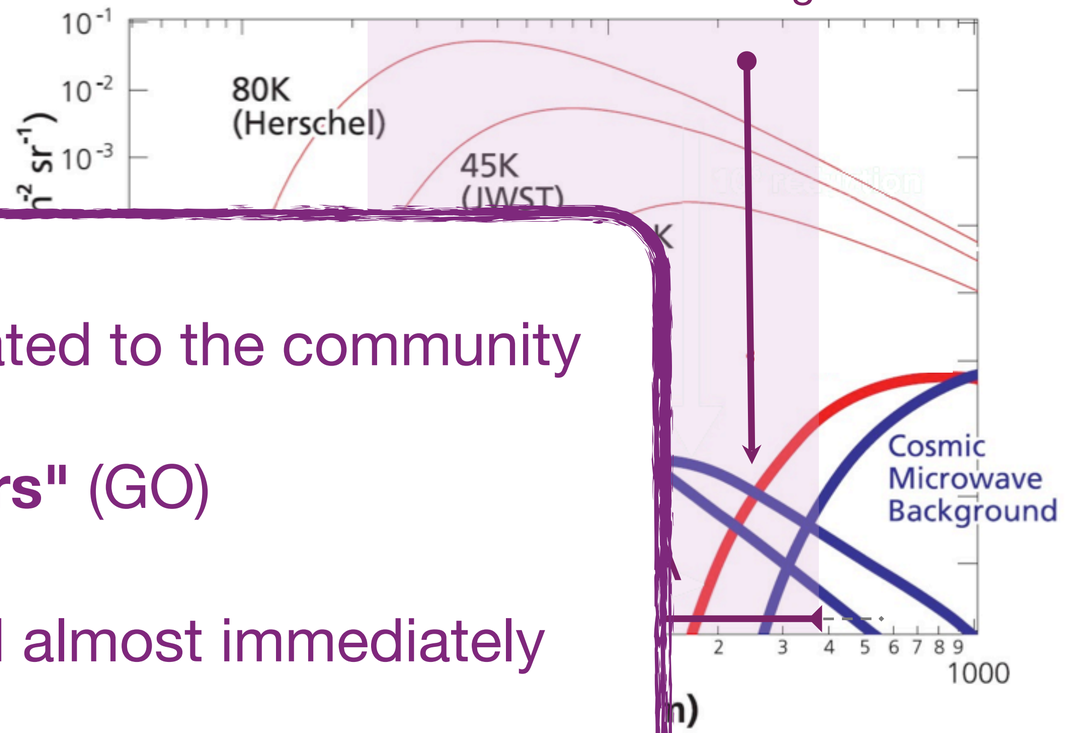
Fast R ~ 10 imaging ($25 \leq \lambda \leq 80\ \mu$m) and broadband polarimetry ($80 \leq \lambda \leq 265\ \mu m$)

≥ 70% of observing time dedicated to the community through

"**General Observers**" (GO)

PI observations will be released almost immediately (<6 months)

10^6 reduction in background!



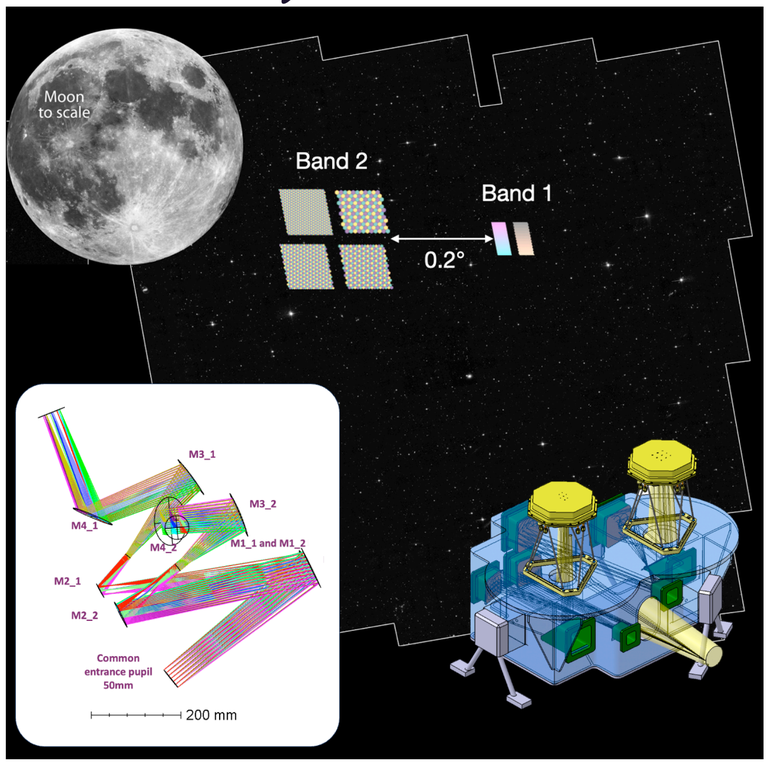
Ratio between the 20% **darkest nights at Mauna Kea** and **day light** in V-band is about **30 millions**.

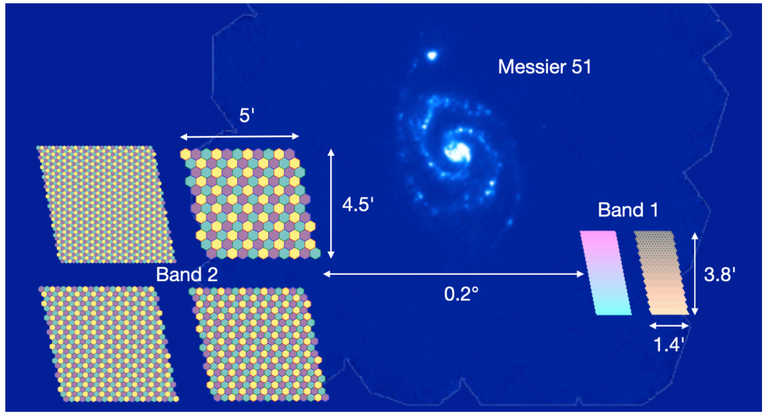
Principal Investigator: **Jason Glenn** (GSFC)

Co-PI: **Margaret Meixner** (JPL)

Project Scientists: **C. Matt Bradford** & **Klaus Pontoppidan** (JPL/Caltech)

Science Lead: **Alexandra Pope** (University of Massachusetts)



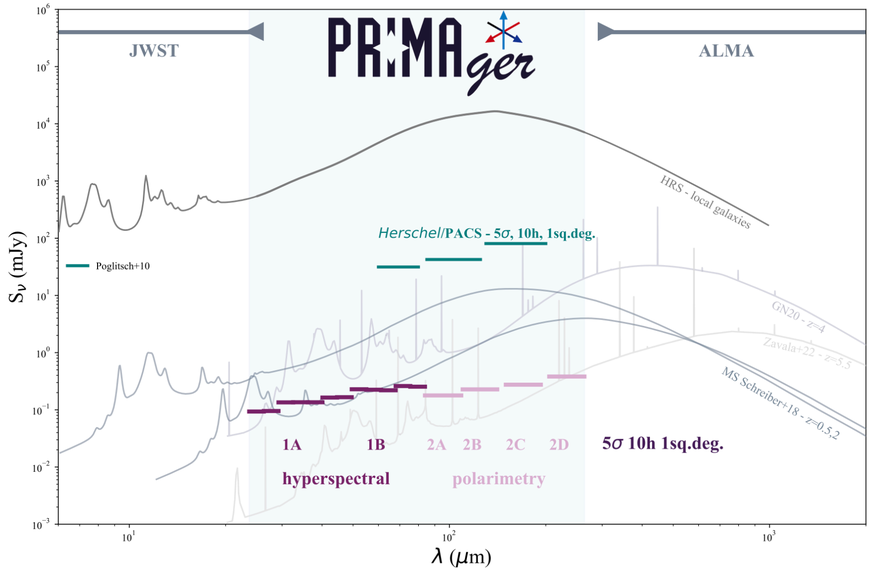


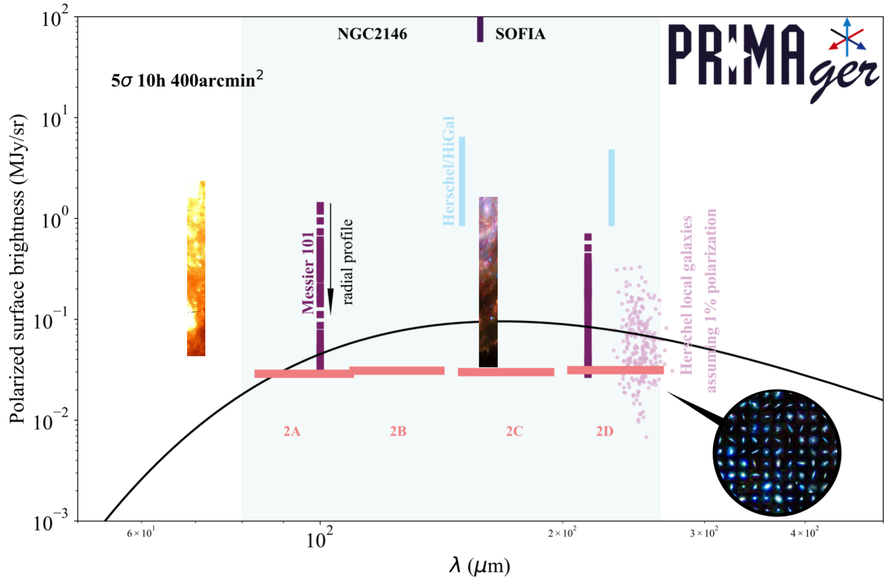
A **hyperspectral** band
25-80 microns
12 filters with R=10

- PAH properties
- Metallicities
- Redshift measurements
- AGN vs star formation
- Trans-neptunian objects
- ...

Dust grains properties
Magnetic field in star-forming structures
AGN dusty torus
...

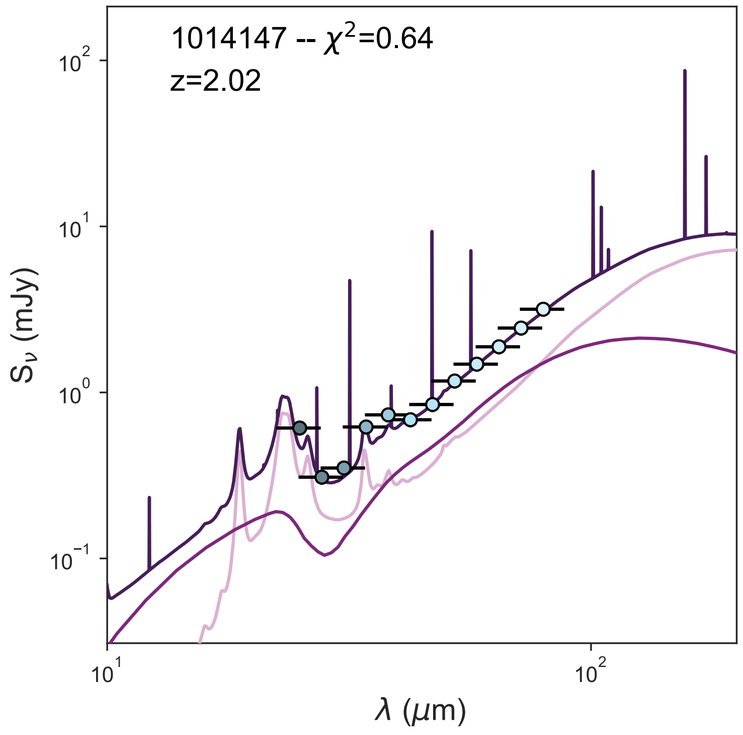
A **polarimeter**
80-264 microns
4 filters with R=4

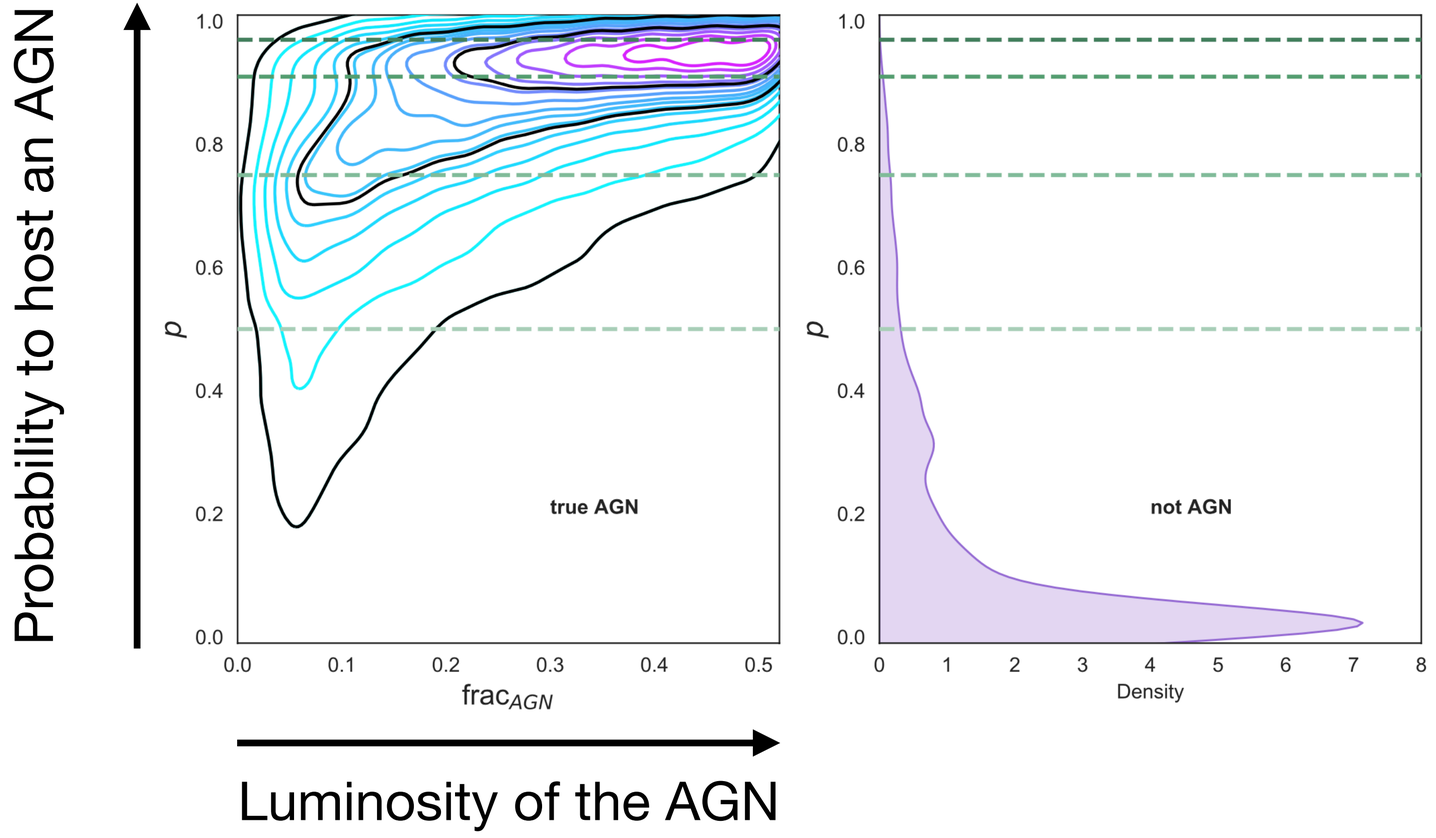




Aluminium based MKIDs cooled at ~100mK

When BOBAFET meets PRIMAger





Astrogirls

Pour qui ?

Cette journée est destinée à une classe de **CE1, CE2** ou **CM1**.

En 2022: **2 classes de CE1** de St Joseph de la Madeleine (13004)

Quoi ?

Une journée de découverte de l'Astrophysique et des métiers qui l'entourent.

Organisée et animée que par des femmes du laboratoire

Les filles et les garçons sont séparés pour les activités

Qui sommes-nous ?

Chercheures, **enseignant-chercheures**, et **ingénieures, et personnel administratif** du LAM

Un grand merci à la SF2A !

et à tous mes collaborateurs !

V. Buat, D. Elbaz, V. Charmandaris, A. Boselli, M. Boquien, D. Burgarella, S. Boissier, M. Béthermin, Y. Roehlly, O. Ilbert, E. Daddi, F. Bournaud, B. Magnelli, C. Gomez-Guijarro, C., S. Boissier, Schreiber, T. Wang, M. Sargent, G. Lagache, M. Sauvage, E. Prieto, J. Fensch, J. Richard, C. Laigle, R. Arango-Toro, M. Hamed, G. Aufort, P. Pudlo, l'équipe PRIMA, les Astrogirls,

j'en oublie surement et j'espère qu'ils m'excuseront!

Mon parcours

Fellowship CNES 2018

CRCN CNRS 2018 —

LAM LABORATOIRE D'ASTROPHYSIQUE DE MARSEILLE — cnes — cnrs

Science

Aix*Marseille université — Socialement engagée

Thèse 2009-2012

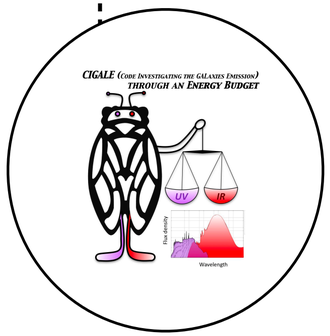
UNIVERSITY OF CRETE

Postdoc 2013-2015

cea

Postdoc
2015-2017

Méthodes - Moyens



Modélisation de l'émission
panchromatique des galaxies

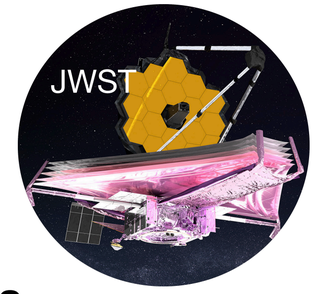
cnrs MITI — MISSION INTERDISCIPLINAIRE POUR LES INITIATIVES TRANSVERSES INTERDISCIPLINAIRES

A*Midex Initiative d'excellence Aix-Marseille

Financements

Histoire de Formation
Stellaire des galaxies

PRIMA



Projets

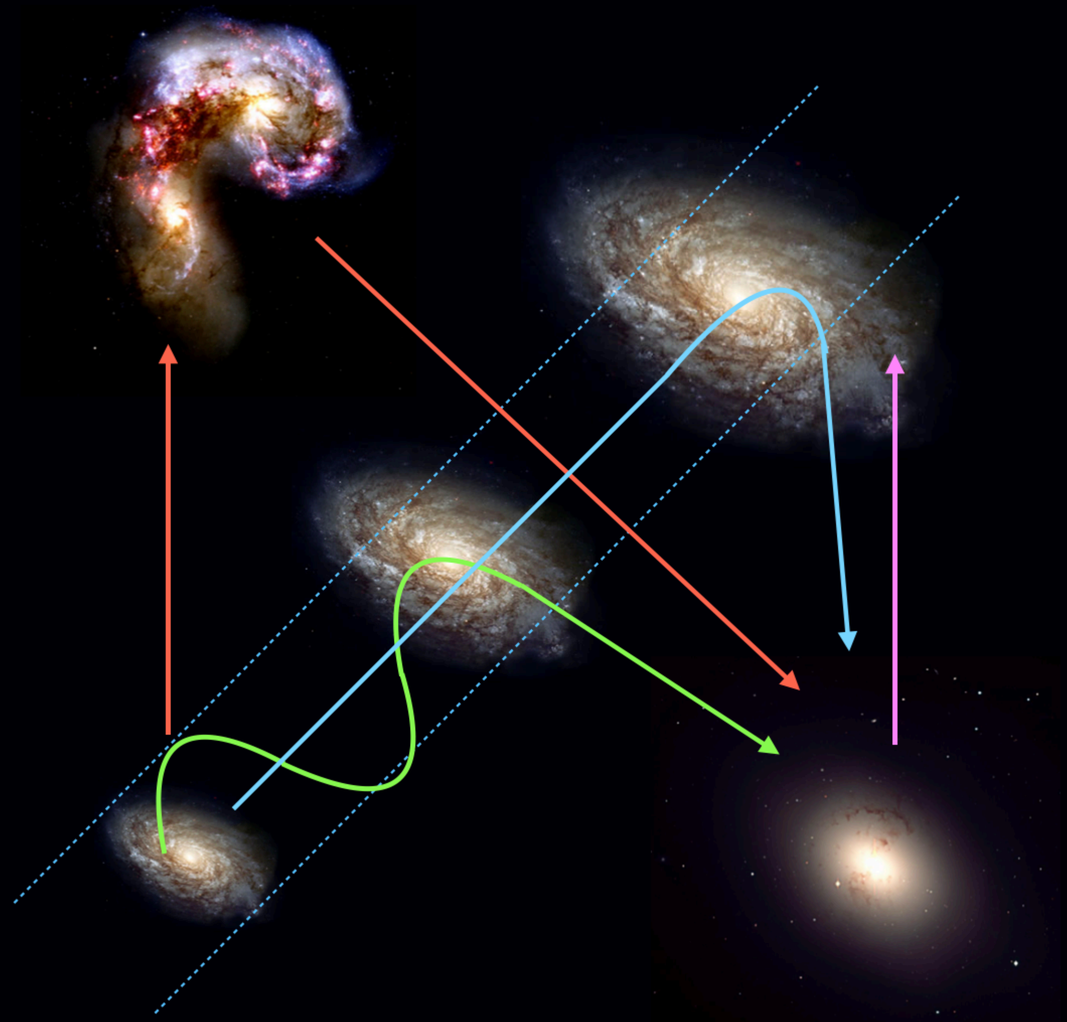
Galaxies star-forming main sequence

Origin of the scatter in scaling relations such as M_*—SFR relation?

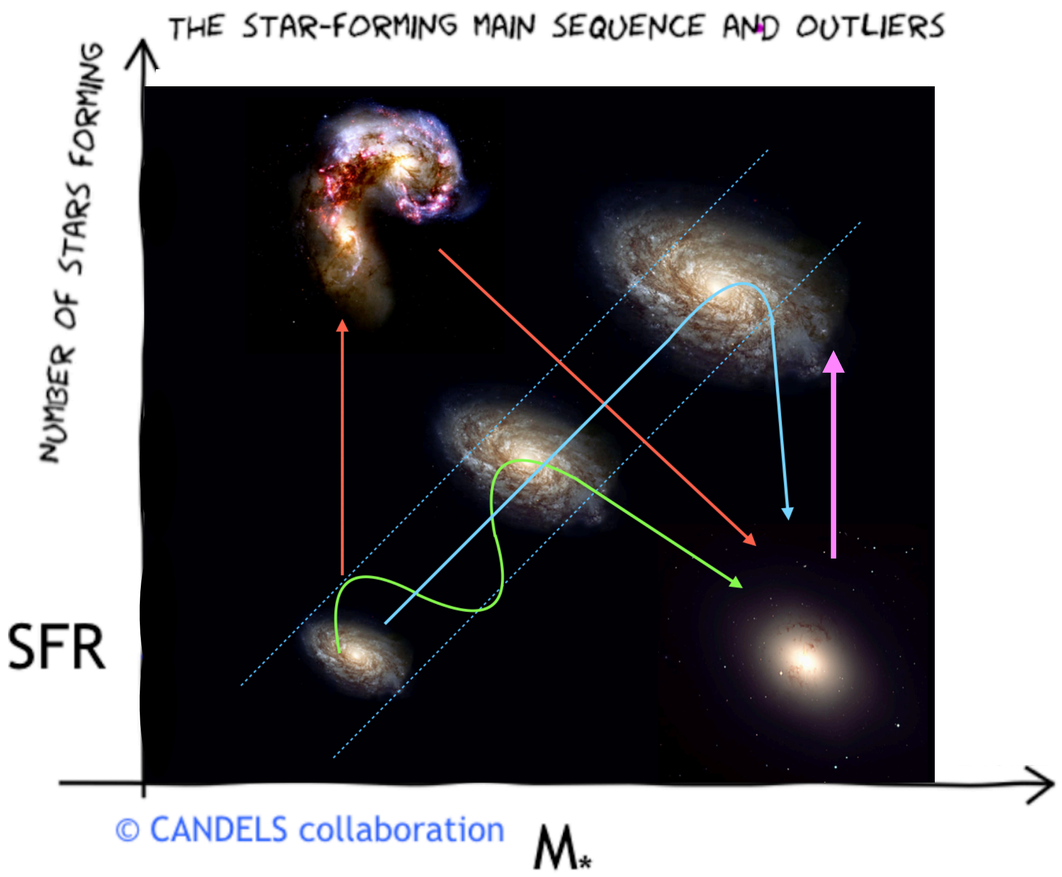
short-term stochasticity associated with self-regulation (0.2-2Gyr)

imprint of a longterm differentiation in growth histories among SFGs of the same mass at a given epoch

Can we **follow galaxies** in their **movements** on the SFR-M_* diagram?



Tacchella et al. 2016, Matthee & Schaye 2019, Förster-Schreiber & Wuyts 2020



We want to probe **quick movements/variations**:

Short timescales **<100Myr**:
formation and destruction of Giant Molecular Clouds

Intermediate scales **~0.1-1Gyr**:
galaxy mergers, disk instabilities, galactic winds,
bar-induced inflows, environmentral effects

Tacchella et al. 2016

Spectroscopy is ideal to probe galaxies SFH
(Balmer lines, Balmer break, etc…)

but spectra available for 1% in COSMOS for instance!

→ need for **statistics** therefore we need a **method using broad band photometry**