Quasars and Gravitational Lenses in STAR

Selected highlights

D. SLUSE

STAR Workshop and Mont Rigi - Sept. 15th

L. Delchambre
GL, Gaia

P. Magain
Cosmology, GL

L. Braibant
Quasars, GL

B. Agíz Gonzalès
Quasars

J-R. Cudell
LSS, Dark matter

C. Hauret
Cosmology, GL

J. Biernaux
GL, Dark Matter

J. Surdej
GL, LSS

B. Pradhan
GL, quasars

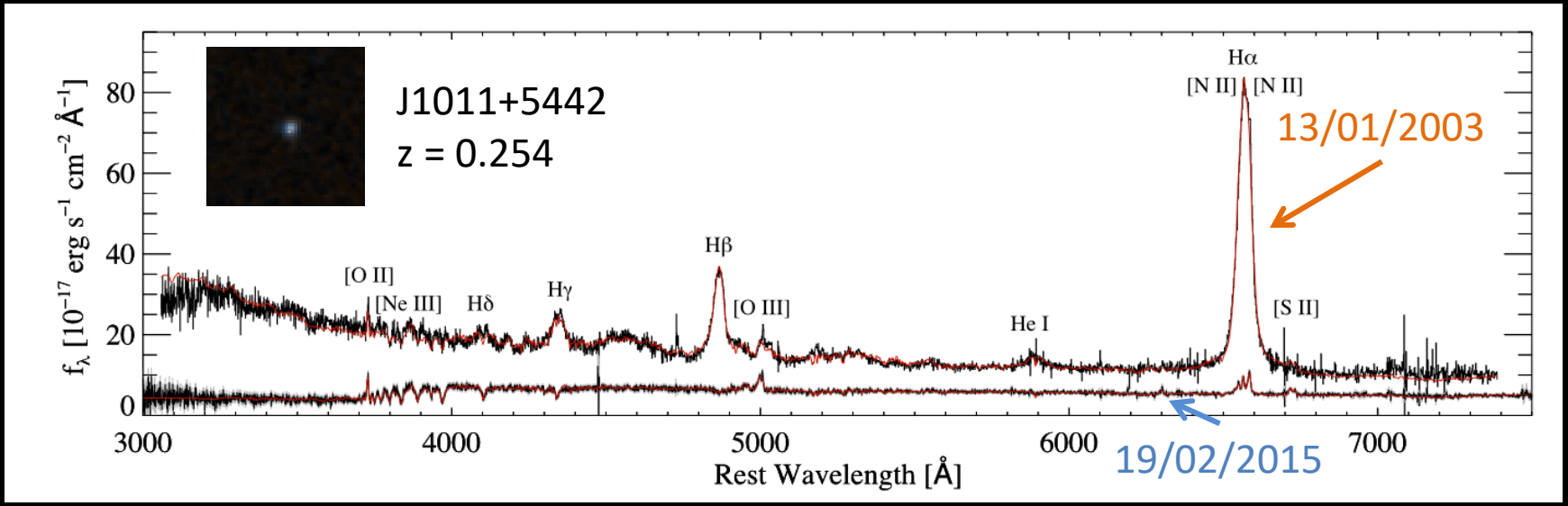
D. Hutsemékers
Quasars, GL, LSS

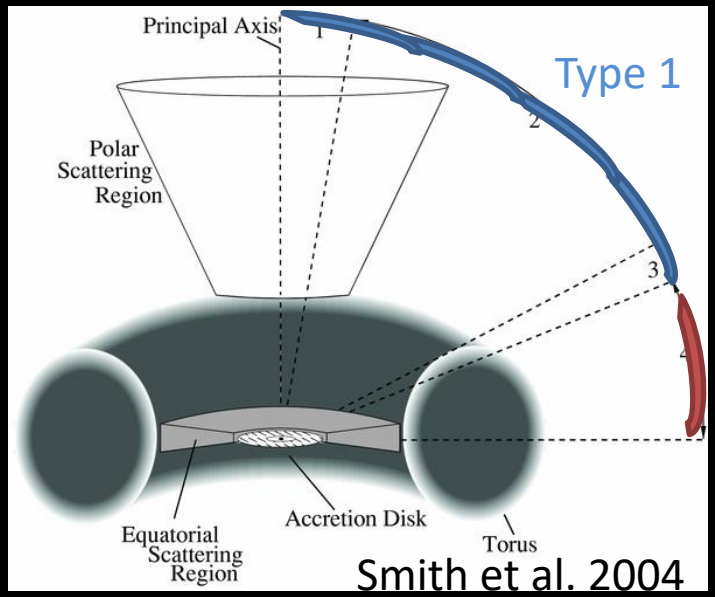
V. Pelgrims
GL, LSS

D. Sluse
GL, quasars

Changing look quasars

Runnoe et al. 2016





Flux dropped by a factor ~10 in < 10 years

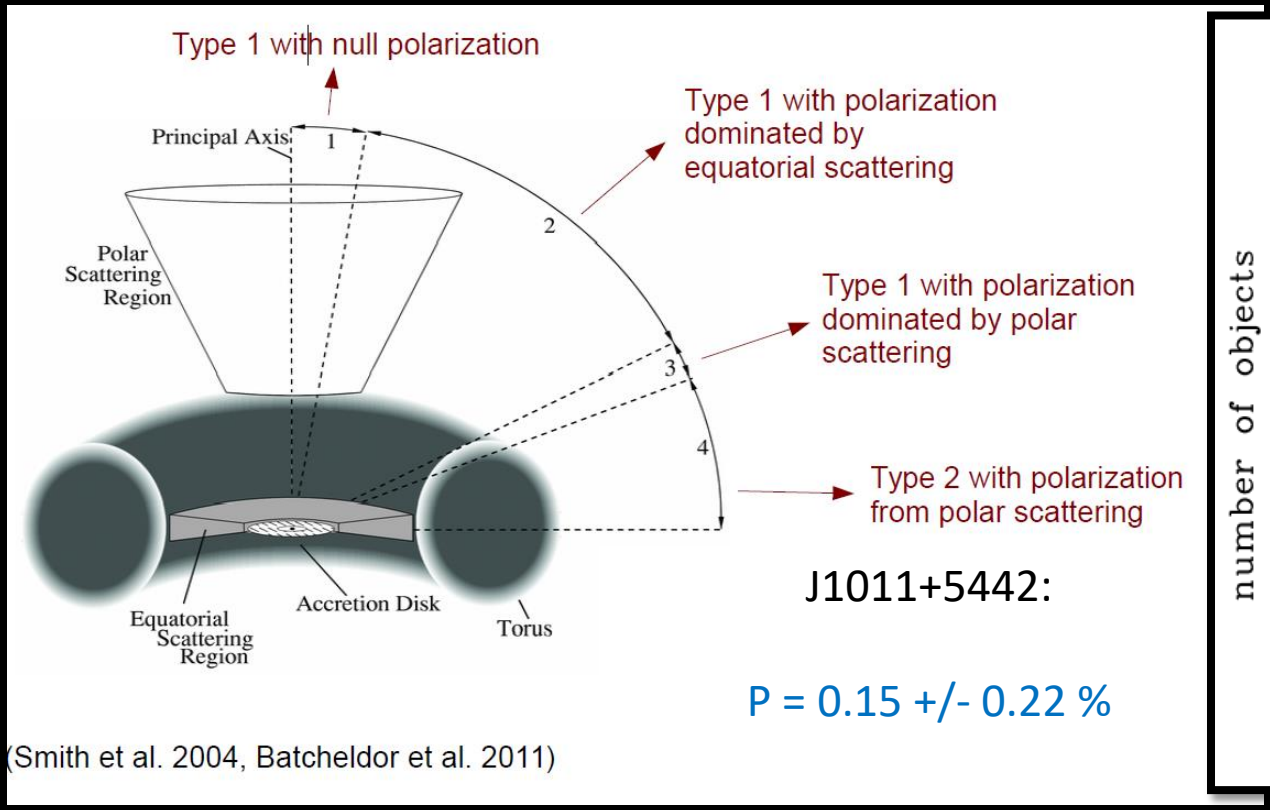
Type 1 -> Type 1.9

Dust obscuration
(and problem w. Unification model)

OR

True dimming

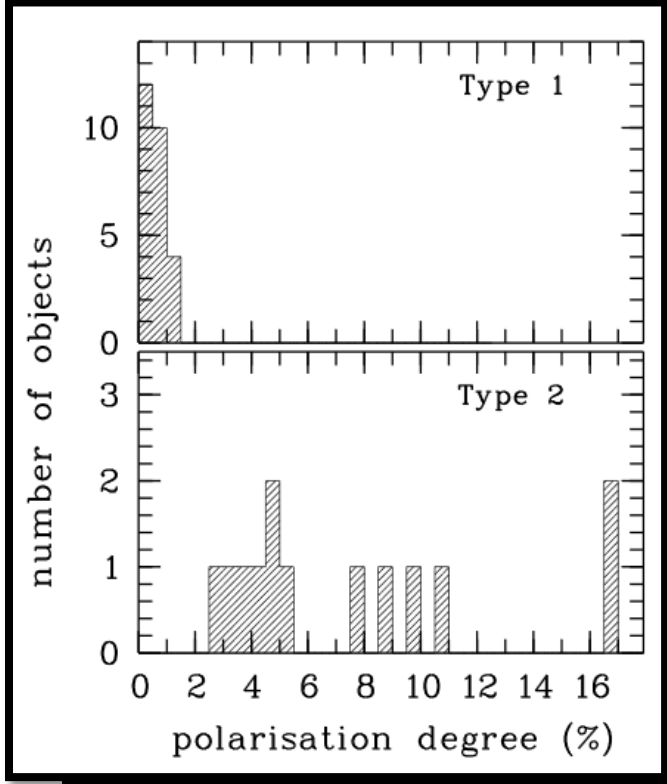
Changing look quasars



(Smith et al. 2004, Batcheldor et al. 2011)

J1011+5442:

P = 0.15 +/- 0.22 %

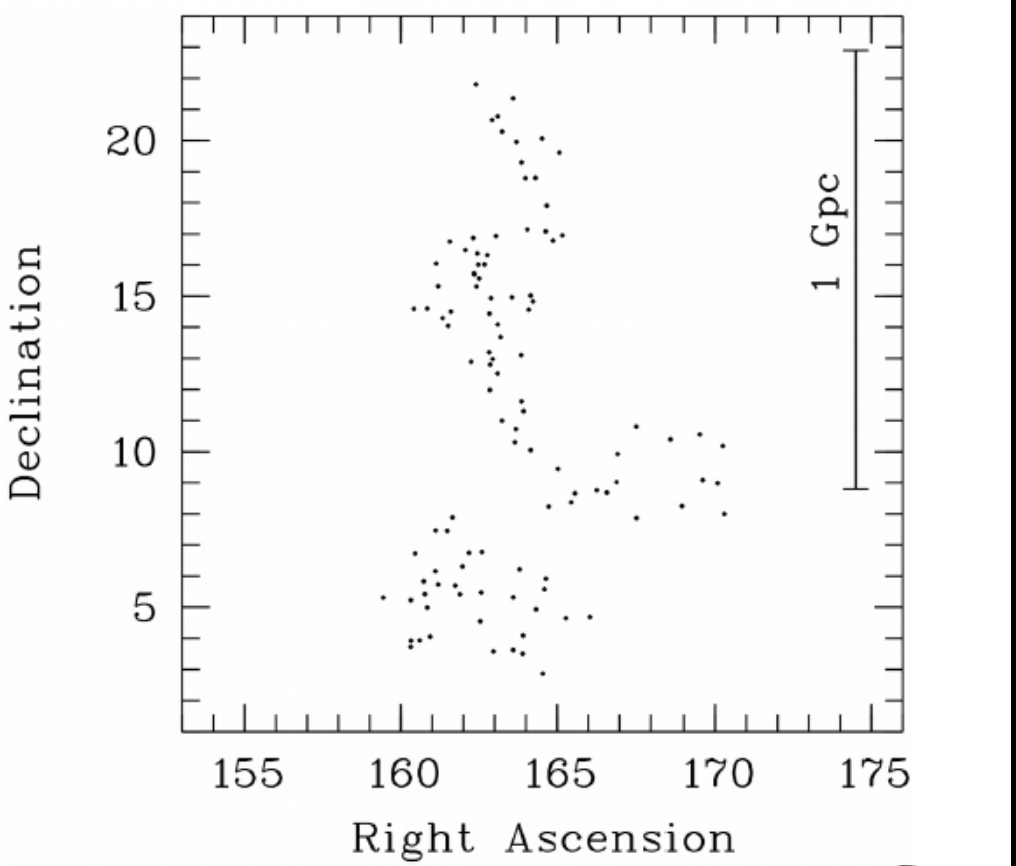


⇒ **"Switch-off" of the central engine**
(Abrupt decrease of Accretion rate)

DH, BAG, DS et al. 2017

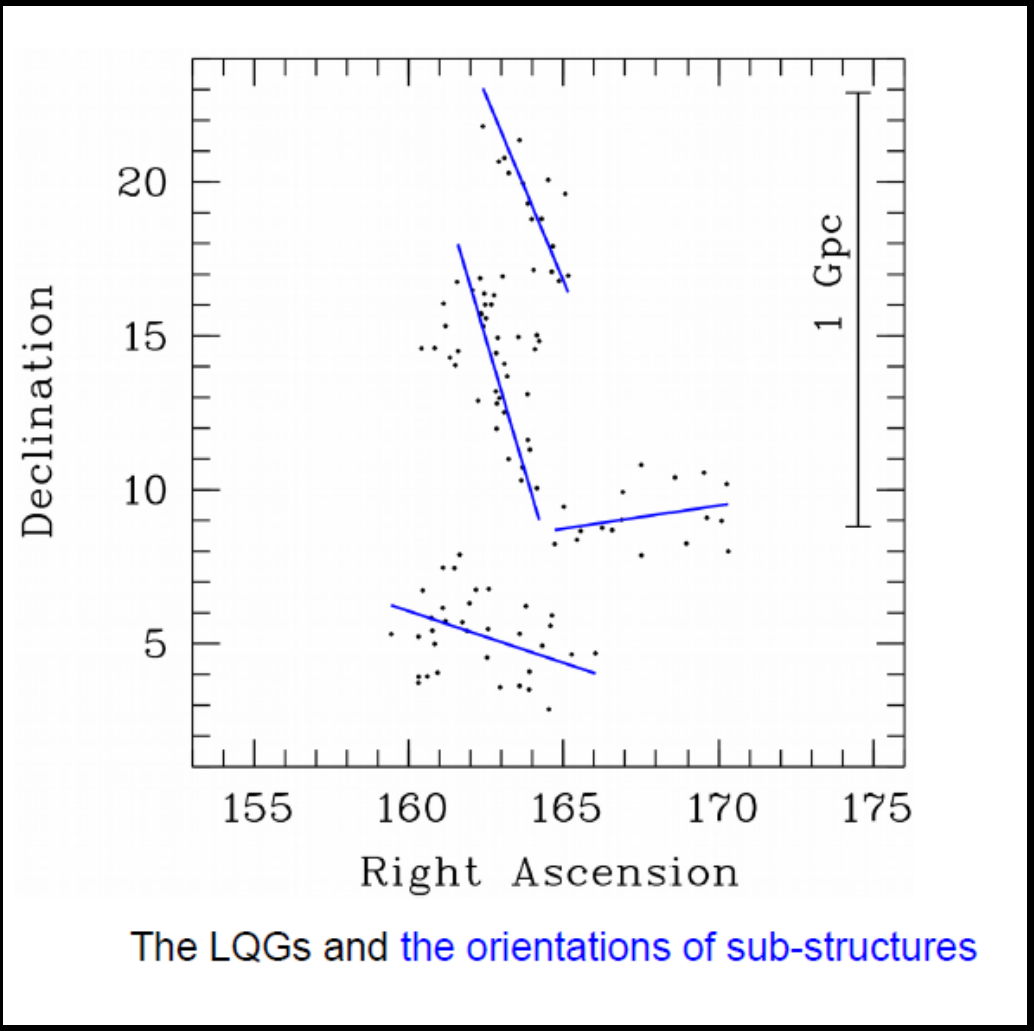


Polarization of quasars in LQGs



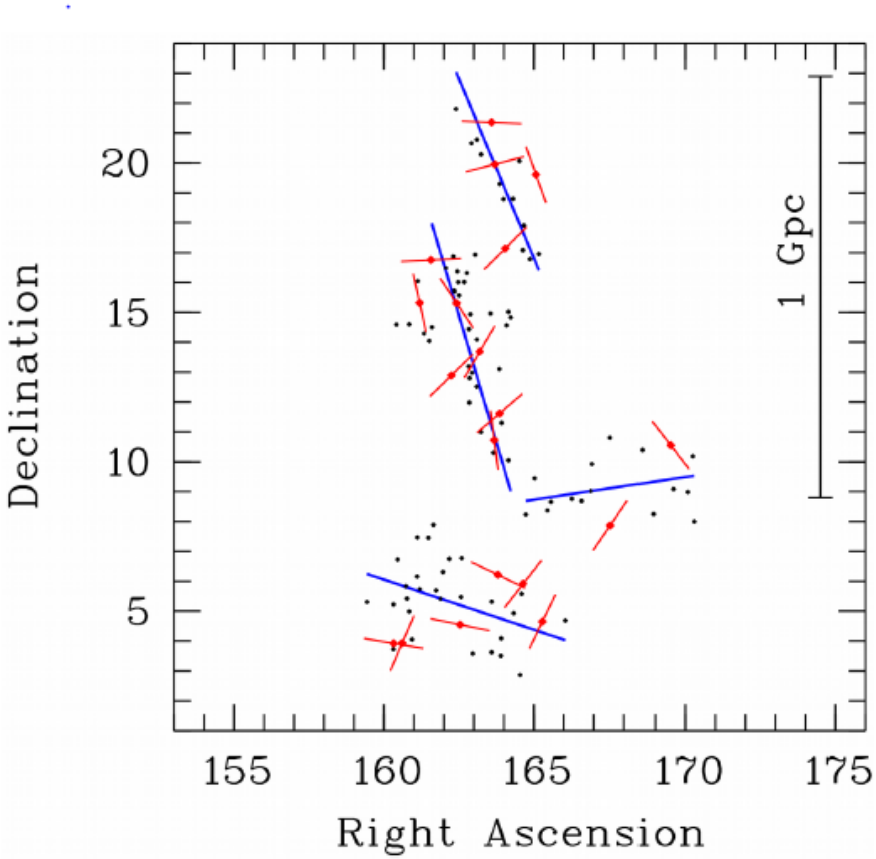
The Huge- and CC- LQGs

Polarization of quasars in LQGs



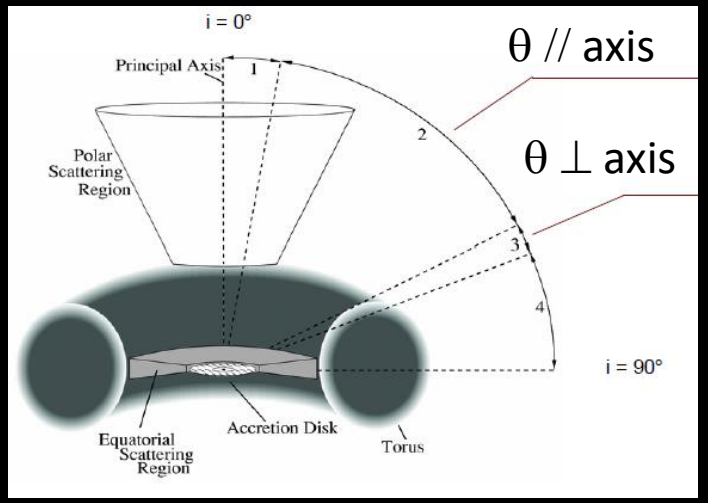
The LQGs and the orientations of sub-structures

Polarization of quasars in LQGs



The LQGs and the orientations of sub-structures In these groups 19 quasars were found to be significantly polarized (p > 0.6%)

Quasars are found to be parallel or perpendicular to the main structure axis: this is explained by orientation (and can be accounted for)

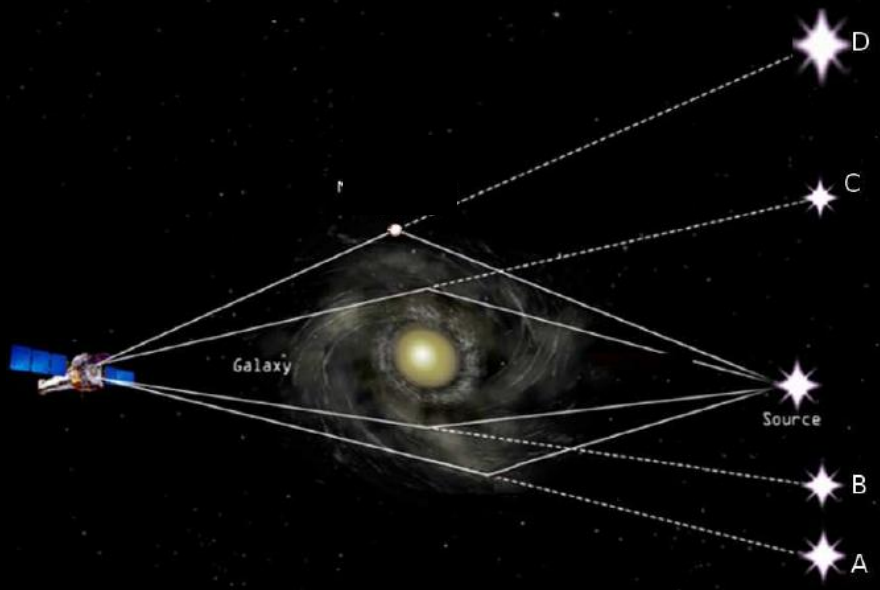


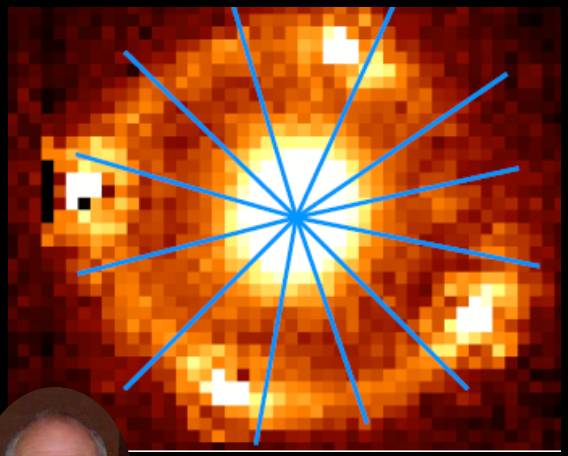
⇒ Statistical test indicate P ~ 1% that the underlying orientation of intrinsic axis is random

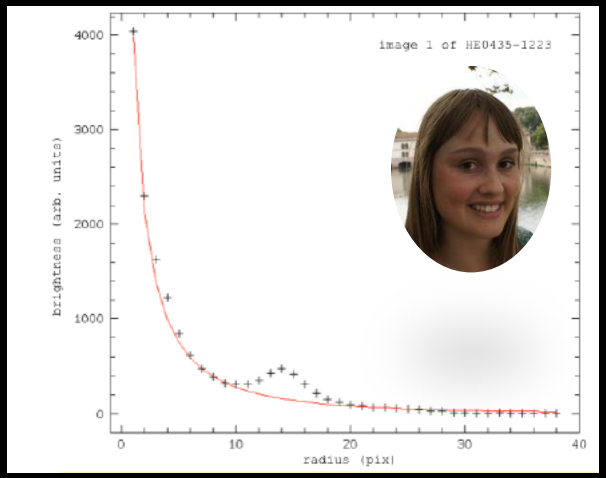
⇒ Spin axis // axis of LSS

DH, LB, VP, DS 2014

Gravitational lenses





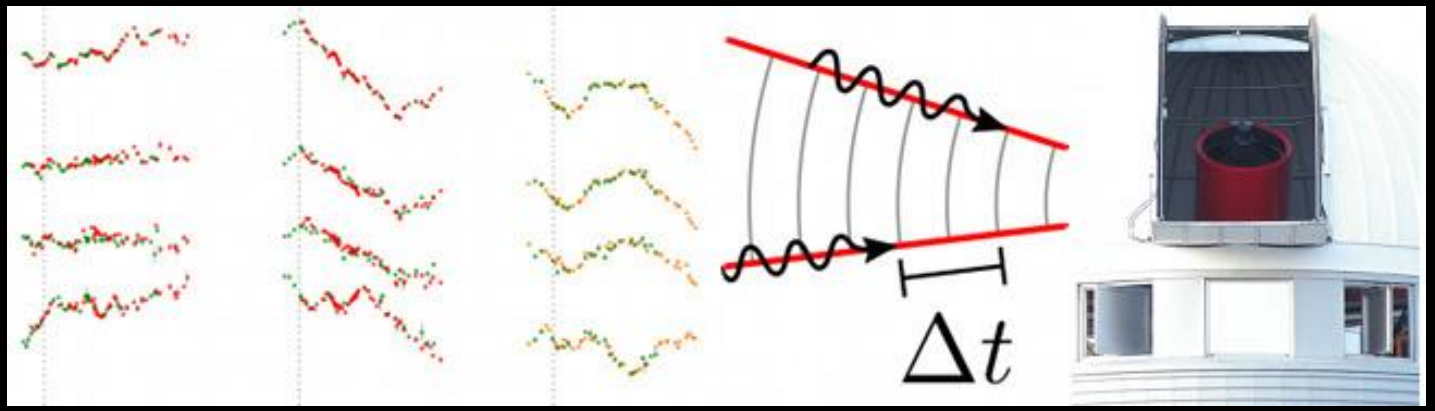


New technique to measure lens galaxy luminosity profile

Comparison of light and total mass => Dark Matter content

JB+ 2016, 2017

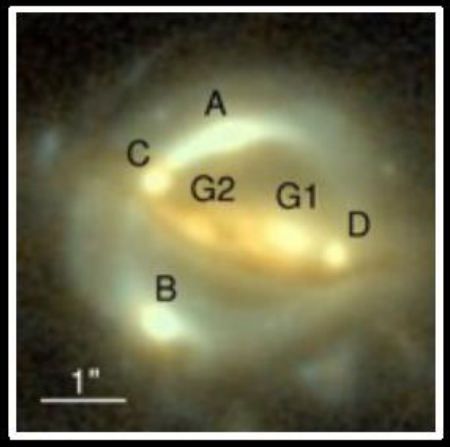
Time delay measurements with COSMOGRAIL



H0LiCOW

H_0 Lenses in COSMOGRAIL's Wellspring

B1608+656



RXJ1131-1231

H_0 to <3.5% precision

HE0435-1223

WFI2033-4723

HE1104-1805

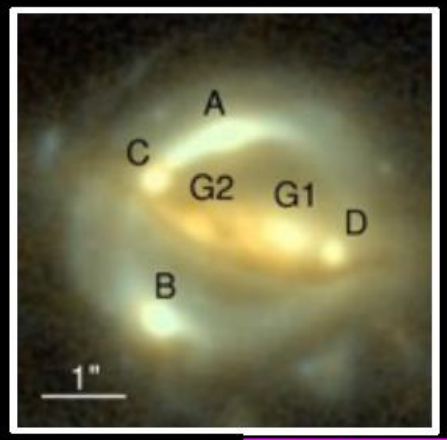
[Suyu et al. 2017]

H0LiCOW

H_0 Lenses in COSMOGRAIL's Wellspring

$H_0 = 71.9^{+2.4}_{-3.0}$ km/s/Mpc

B1608+656



RXJ1131-1231

completed

[Suyu et al. 2010, 2013, 2014, 2017, Rusu et al. 2017, Sluse et al. 2017, Wong et al. 2017, Bonvin et al. 2017]

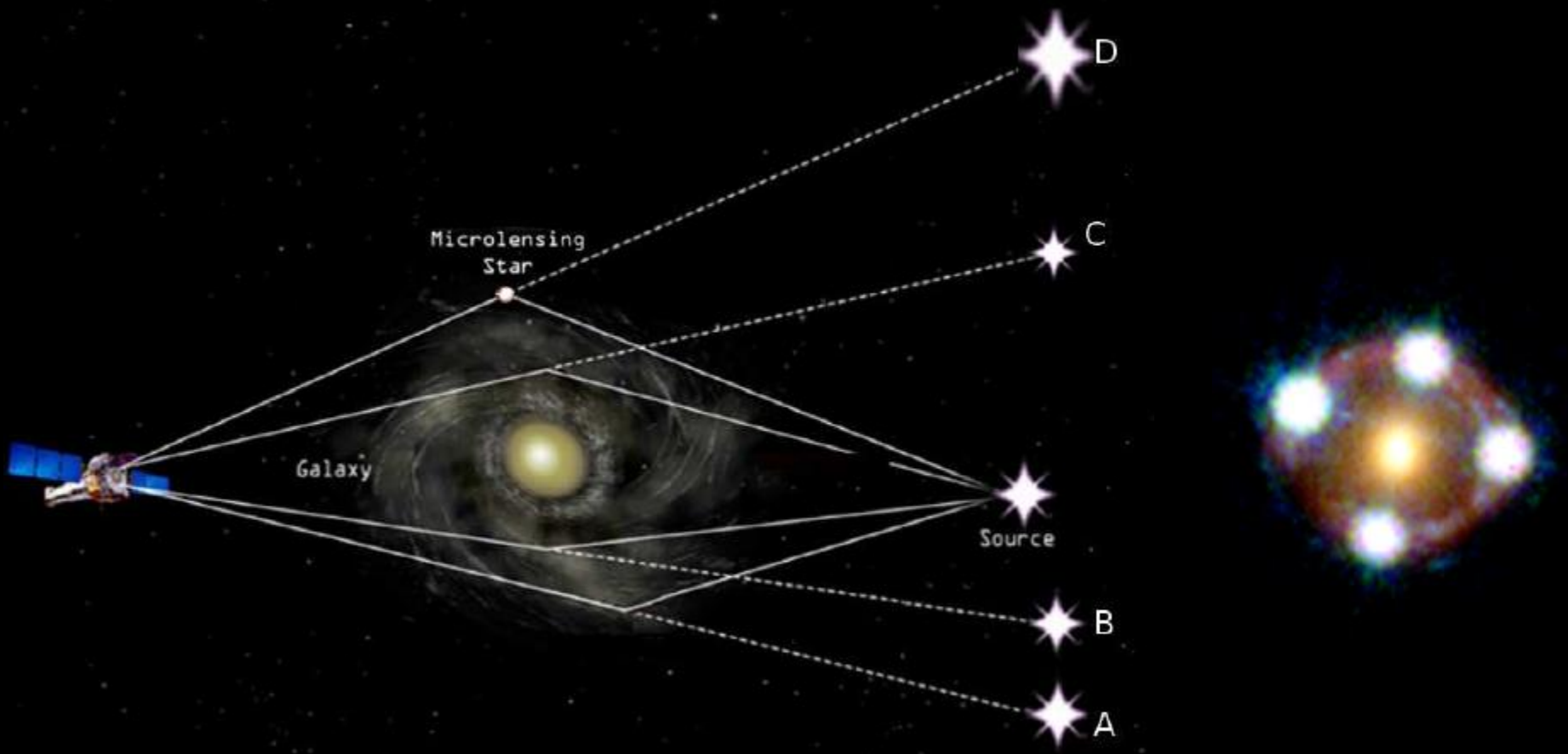
HE0435-1223

WFI2033-4723

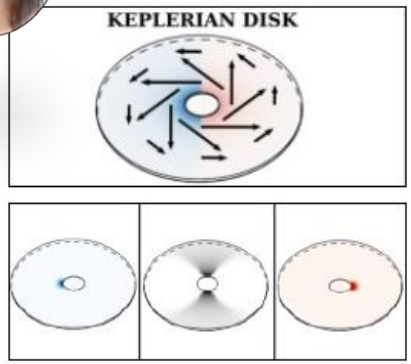
HE1104-1805

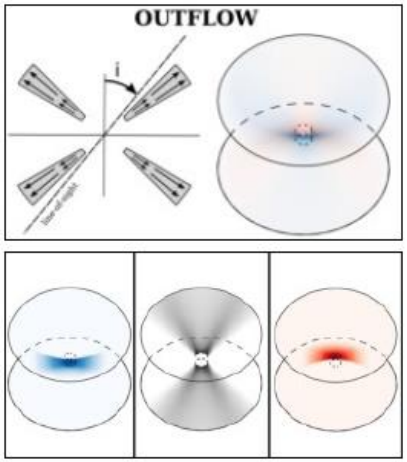
ongoing

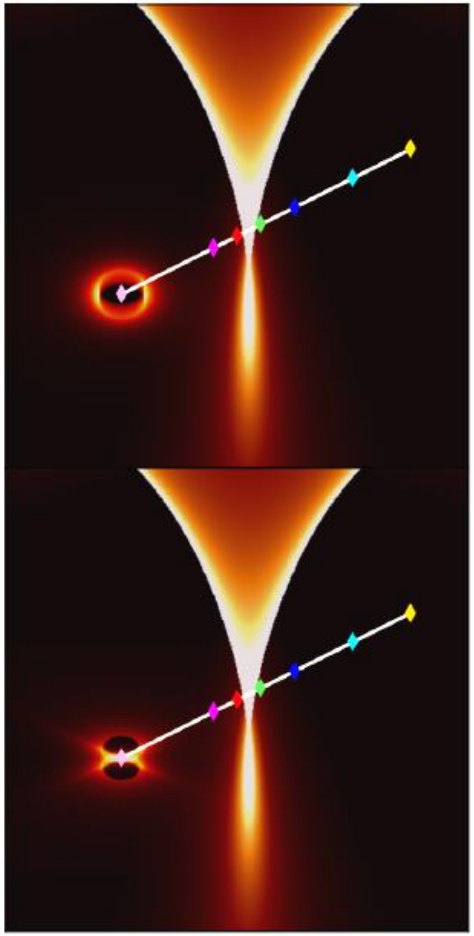
Quasar Microlensing

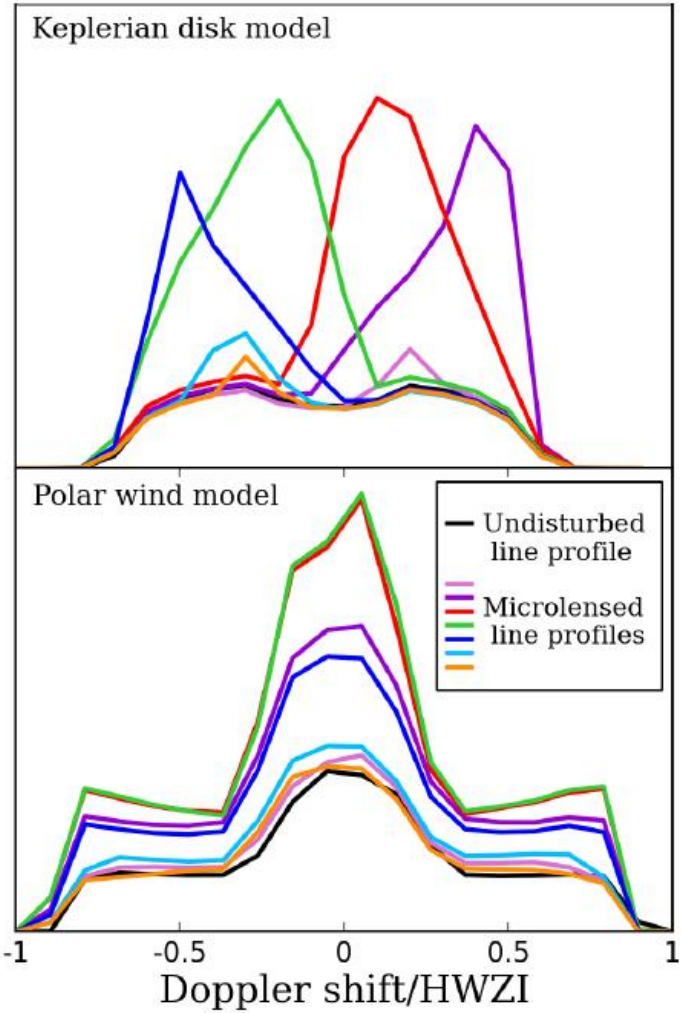


Simulation of microlensing of BELR



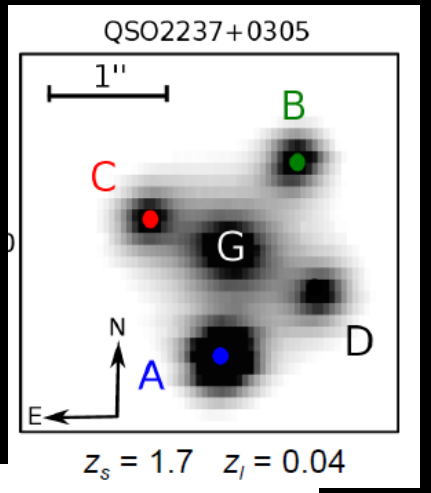






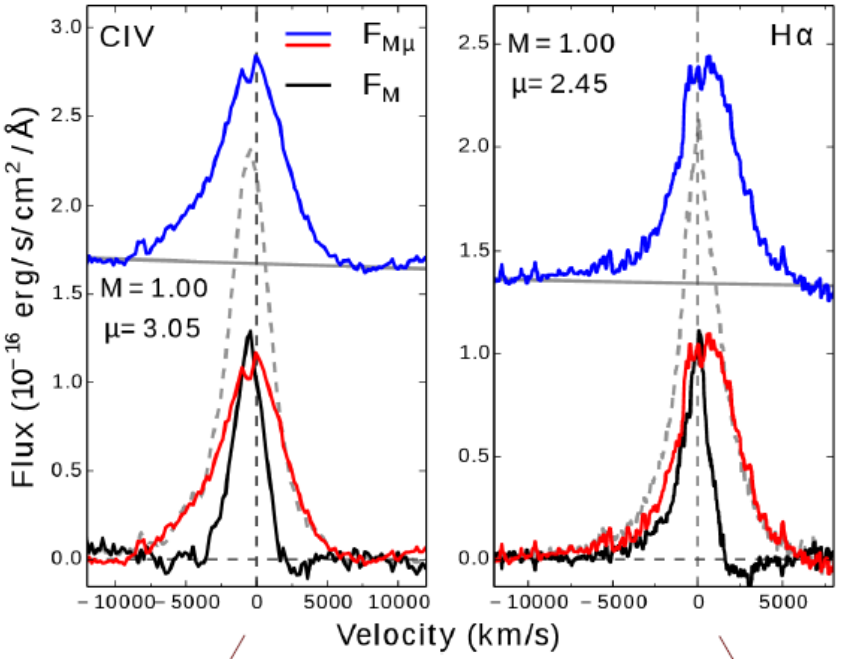
Observed signal

Spectral decomposition using 2 spectra: one ML, the other not



high ionization

low ionization



Polar Wind

Keplerian Disk

Wings microlensed, Core not

Red wing microlensed Blue wing not

LB+ 2014, 2016, 2017

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