EVOLVING GALAXIES IN THE EVOLVING UNIVERSE

TEAM

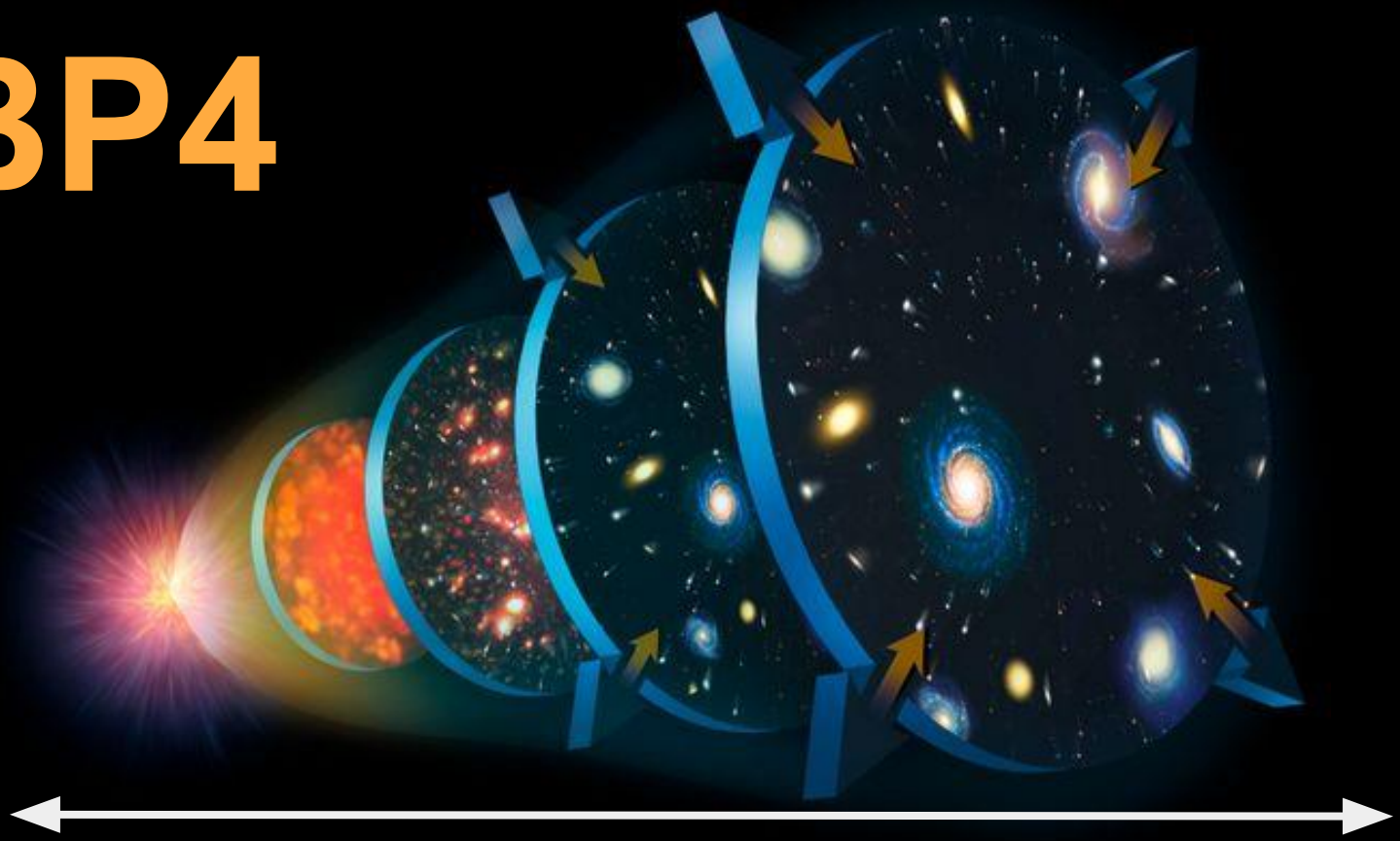
BP4

It’s all about the evolution

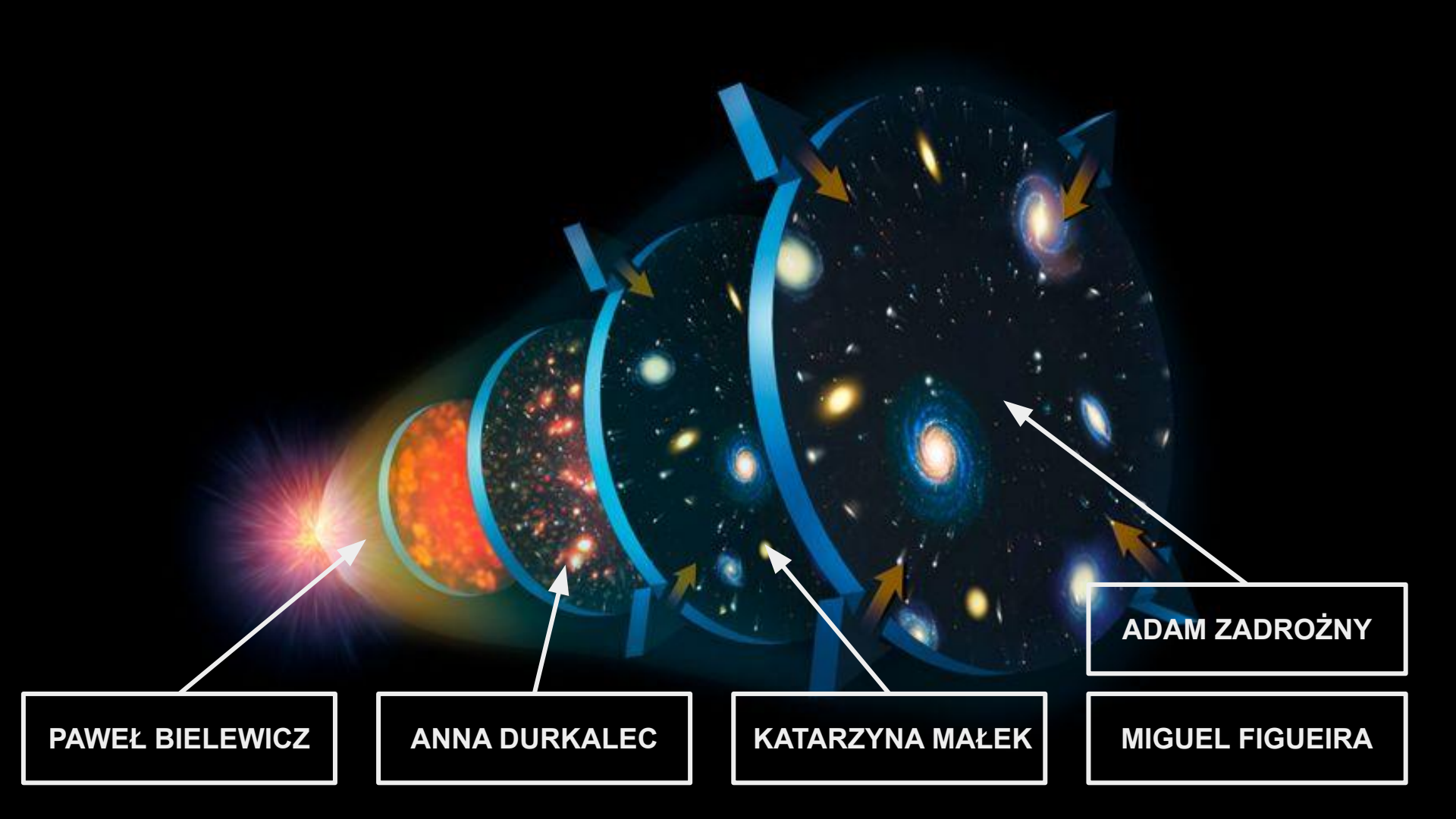
EVOLVING UNIVERSE

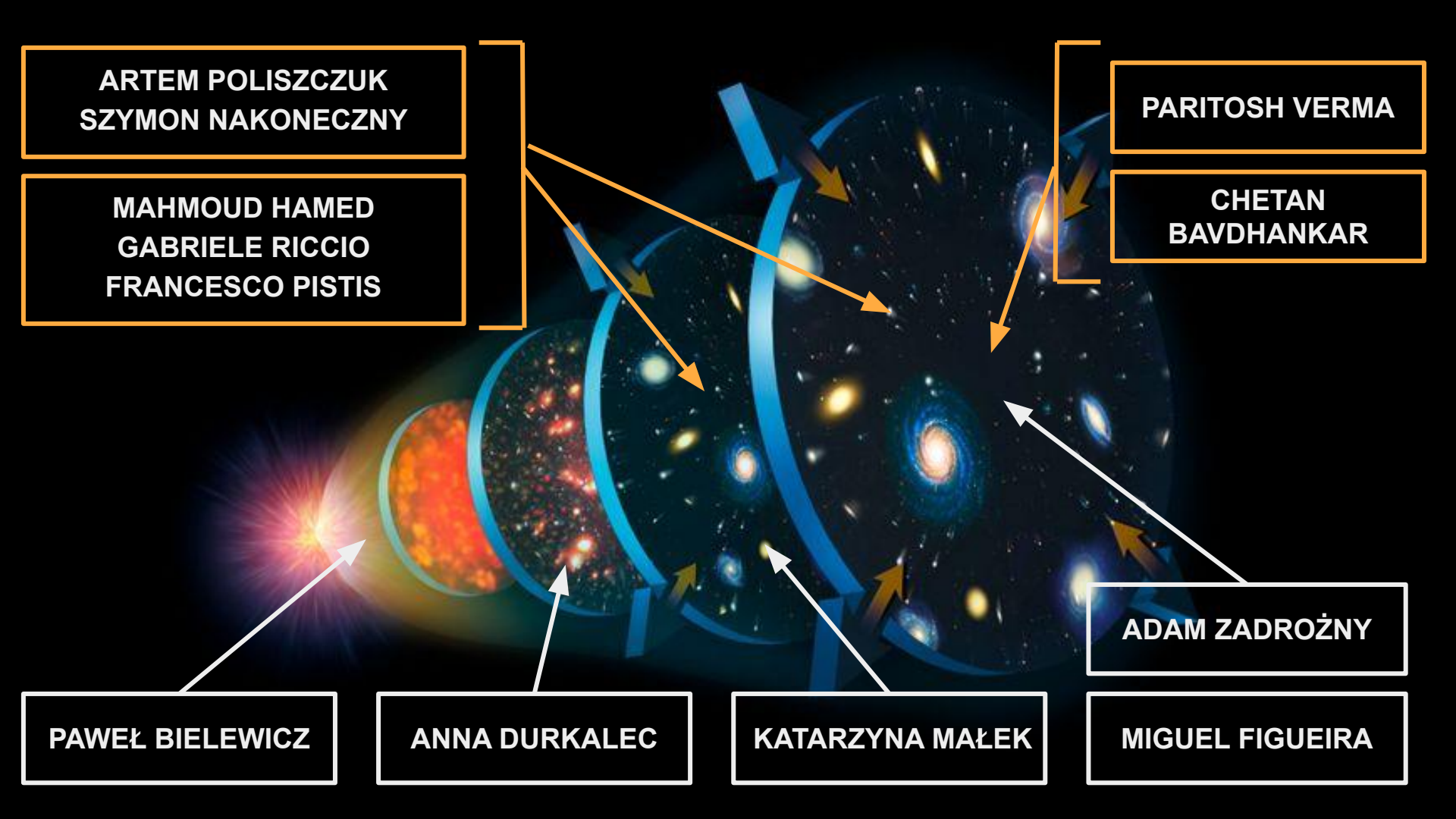
13.82 BILLION YEARS

BP4



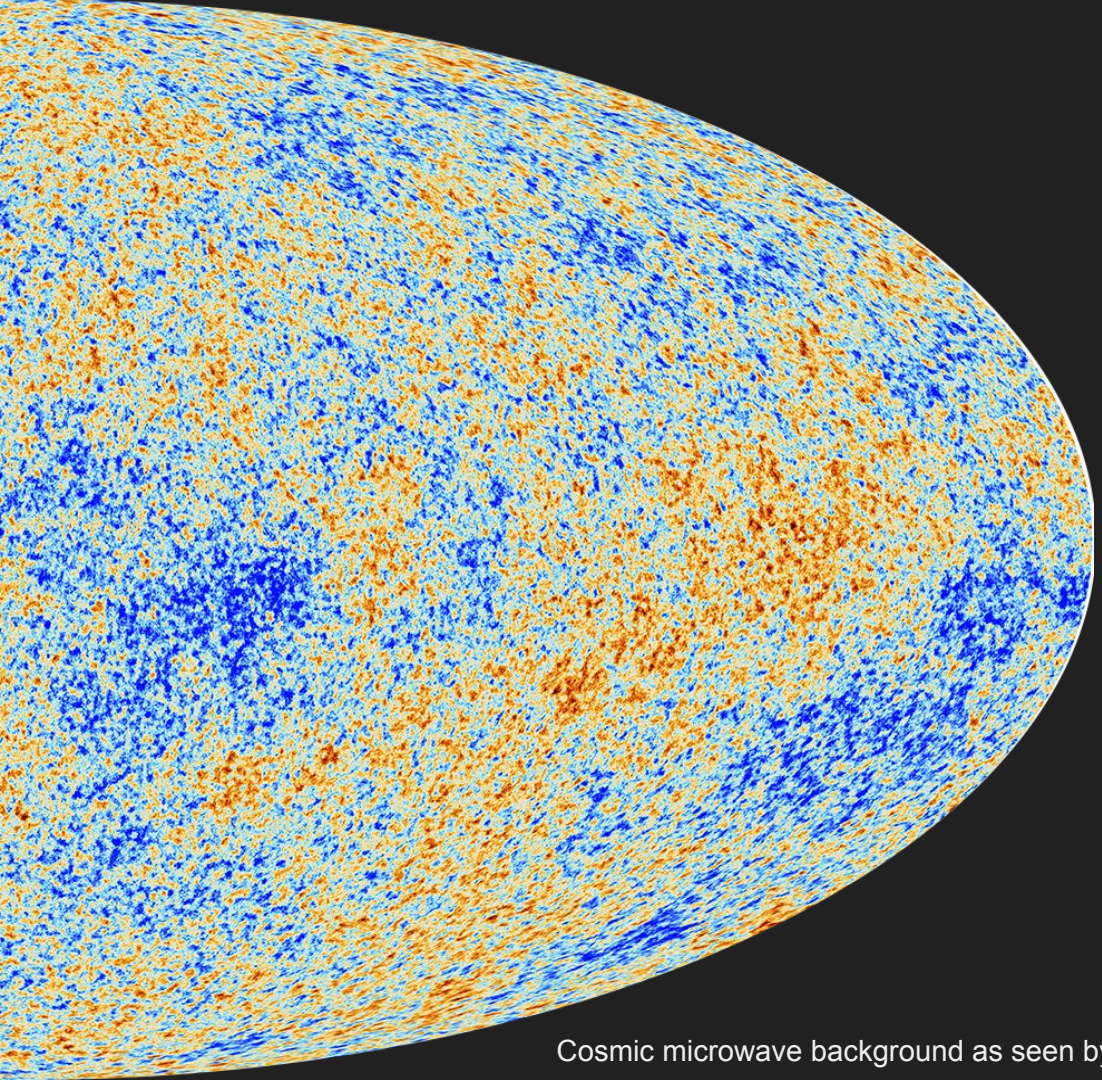
13.8196 BILLION YEARS


ADAM ZADROŻNY
PAWEŁ BIELEWICZ
ANNA DURKALEC
KATARZYNA MAŁEK
MIGUEL FIGUEIRA


ARTEM POLISZCZUK
SZYMON NAKONECZNY
MAHMOUD HAMED
GABRIELE RICCIO
FRANCESCO PISTIS
PARITOSH VERMA
CHETAN BAVDHANKAR
ADAM ZADROŻNY
PAWEŁ BIELEWICZ
ANNA DURKALEC
KATARZYNA MAŁEK
MIGUEL FIGUEIRA

LET'S START FROM THE OLDEST RADIATION

WORK BY PAWEŁ BIELEWICZ AND PLANCK COLLABORATION



Cosmic microwave background as seen by Planck

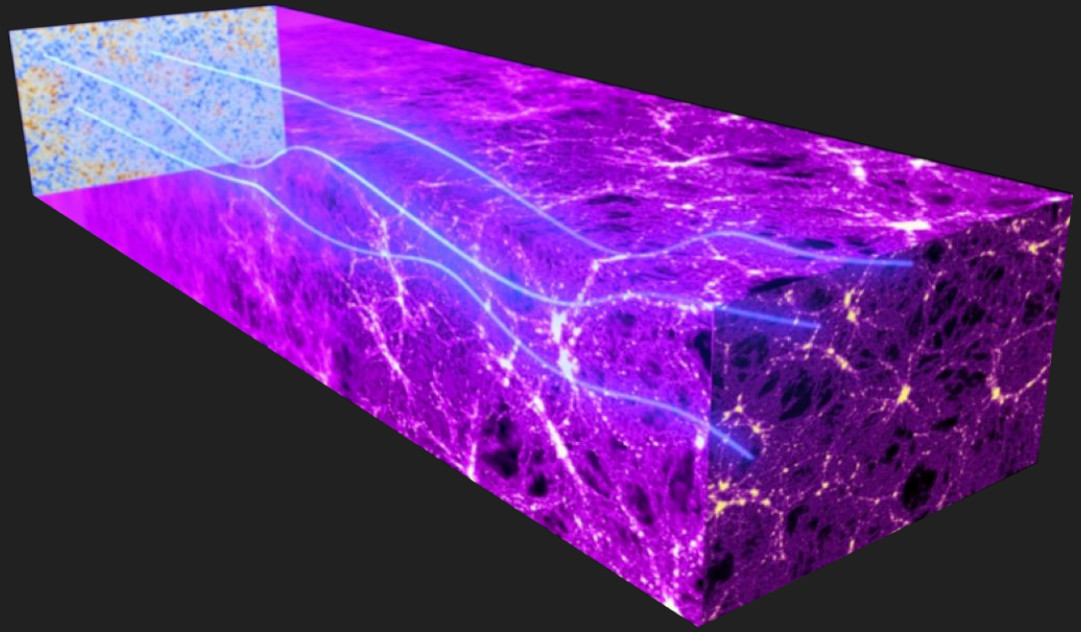
STUDIES BASED ON THIS PICTURE:

CONFIRM ΛCDM

ALLOWING TO ESTIMATE
COSMOLOGICAL PARAMETERS WITH

99%

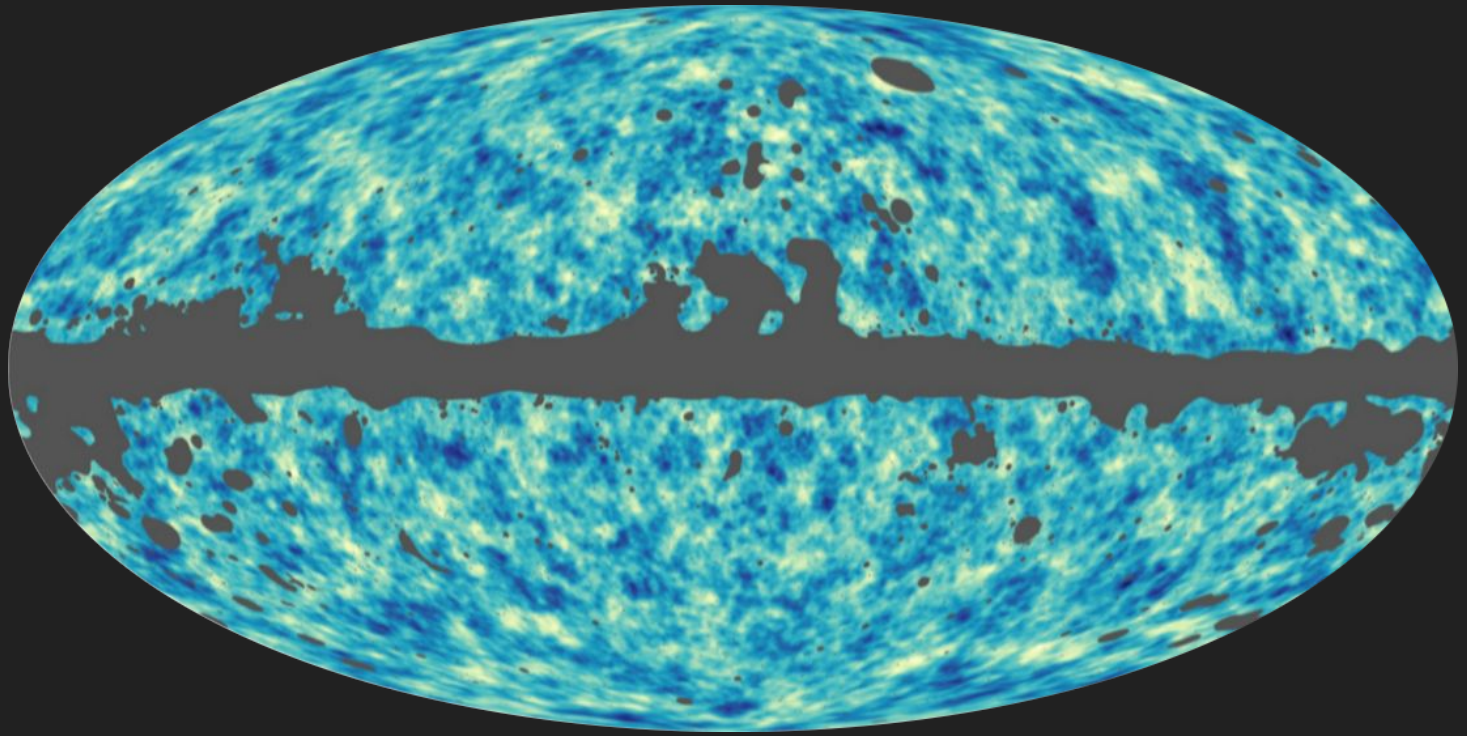
(OR HIGHER!) ACCURACY



GRAVITATIONAL LENSING OF CMB
ALLOWS TO TRACE

DARK MATTER

DISTRIBUTION IN THE REDSHIFT
RANGE $1 < z < 4$



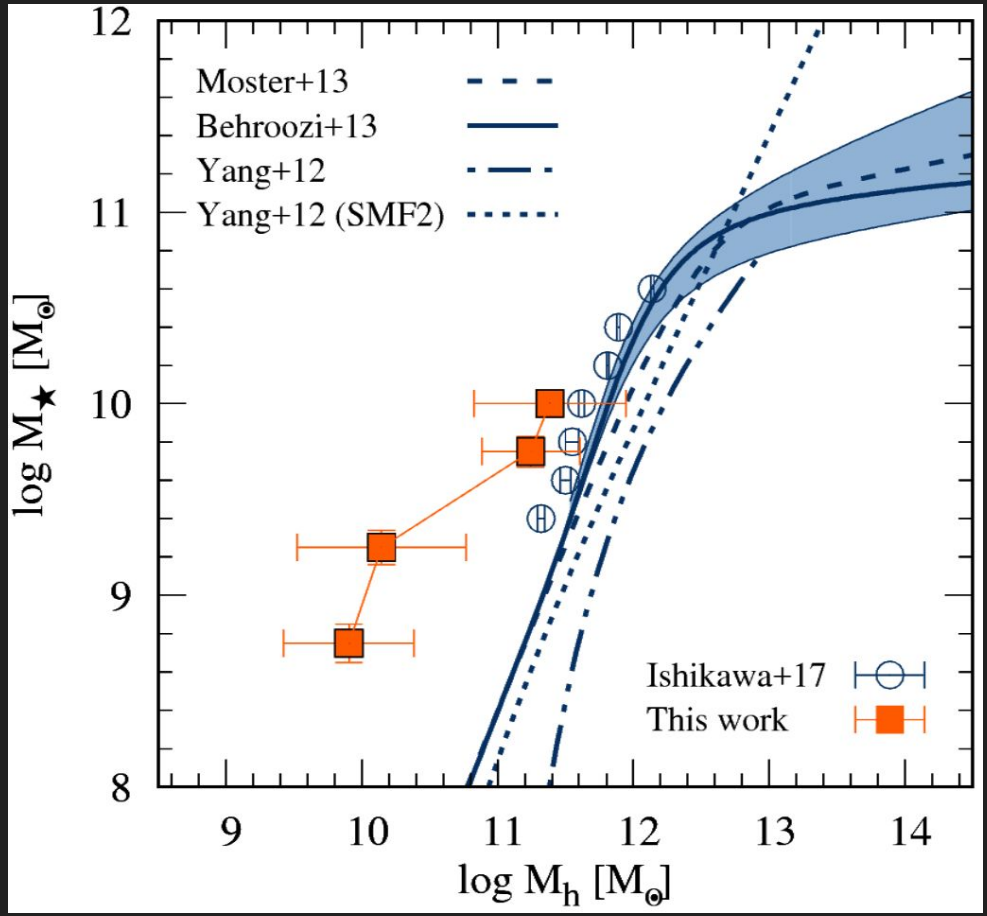
OVER THE FULL SKY!

(WELL OK… ALMOST)

TOWARD HIGH REDSHIFT GALAXIES

WORK BY ANNA DURKALEC AND VUDS COLLABORATION

WE HAVE GREAT THEORETICAL MODELS, BUT SOMETIMES WE DISAGREE WITH THEM.



Durkalec et al. (2018)

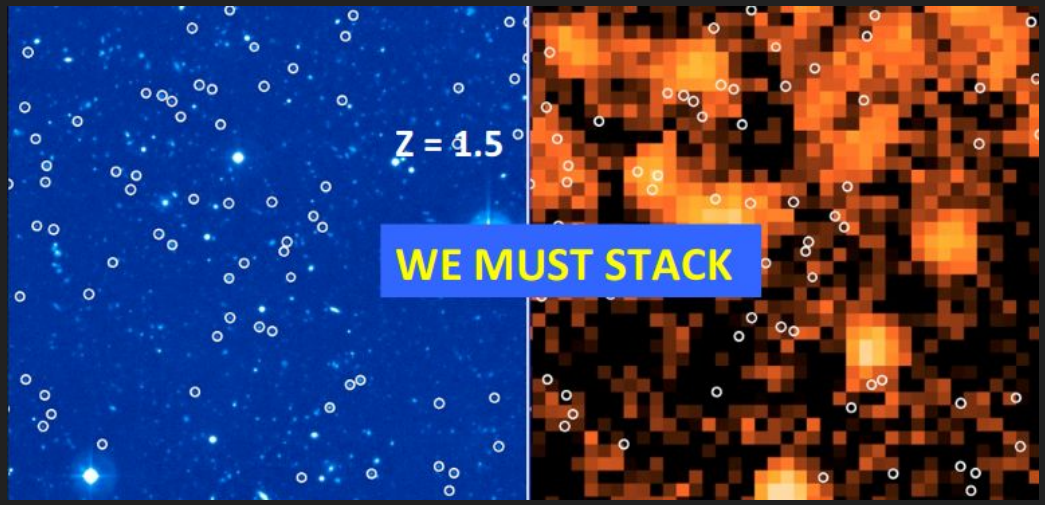
EVOLVING GALAXIES

AND DETAILED GALAXY PROPERTIES

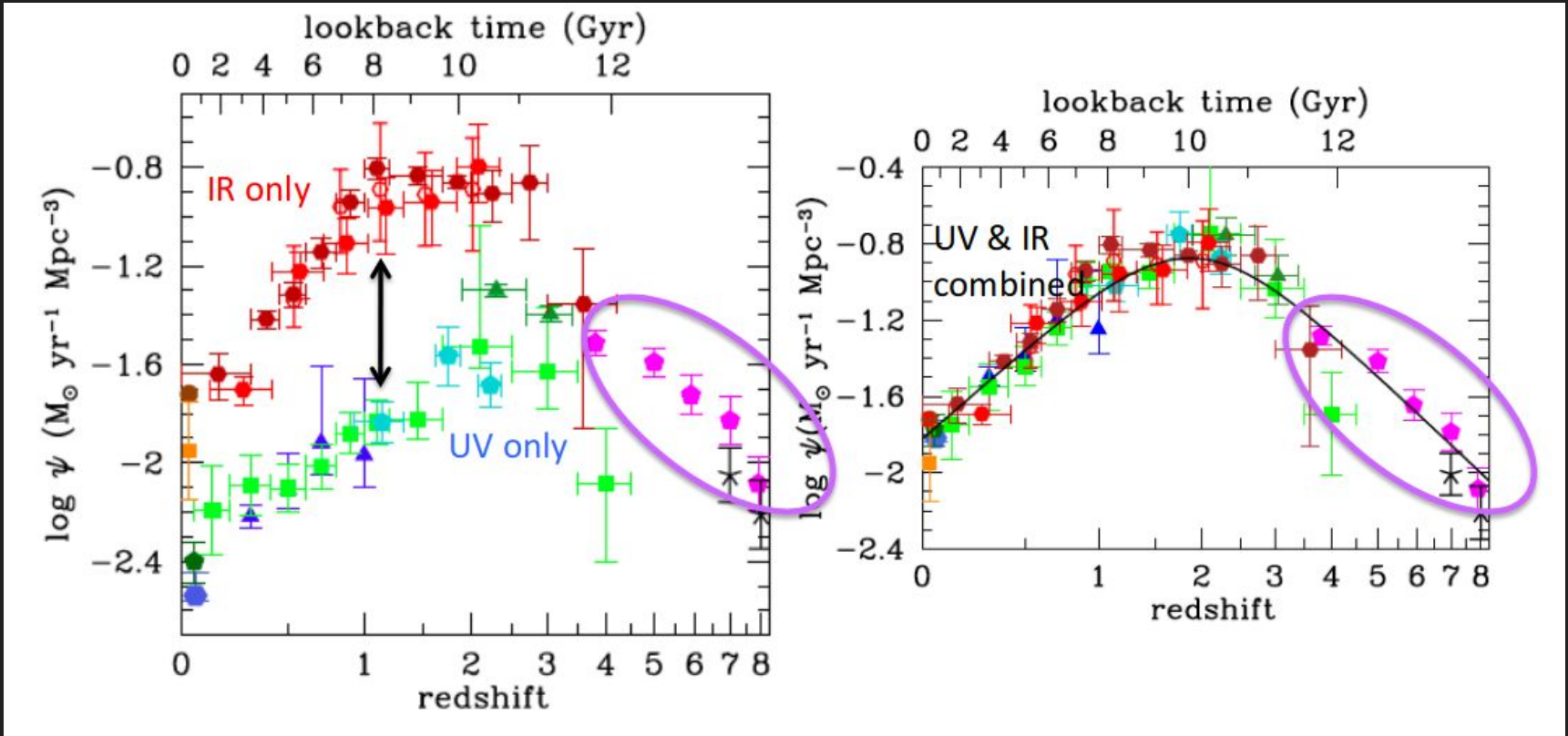
WORK BY KATARZYNA MAŁEK, MAHMOUD HAMED, GABRIELLE RICIO AND FRANCESCO PISTIS AS A PART OF VIPERS AND HELP COLLABORATIONS

BOTH UV AND IR EMISSIONS ARE RELATED TO STAR FORMATION

PROBLEM IS THAT USUALLY THERE ARE NO COUNTERPARTS OF UV-REST FRAME SELECTED SOURCES TO IR SOURCES

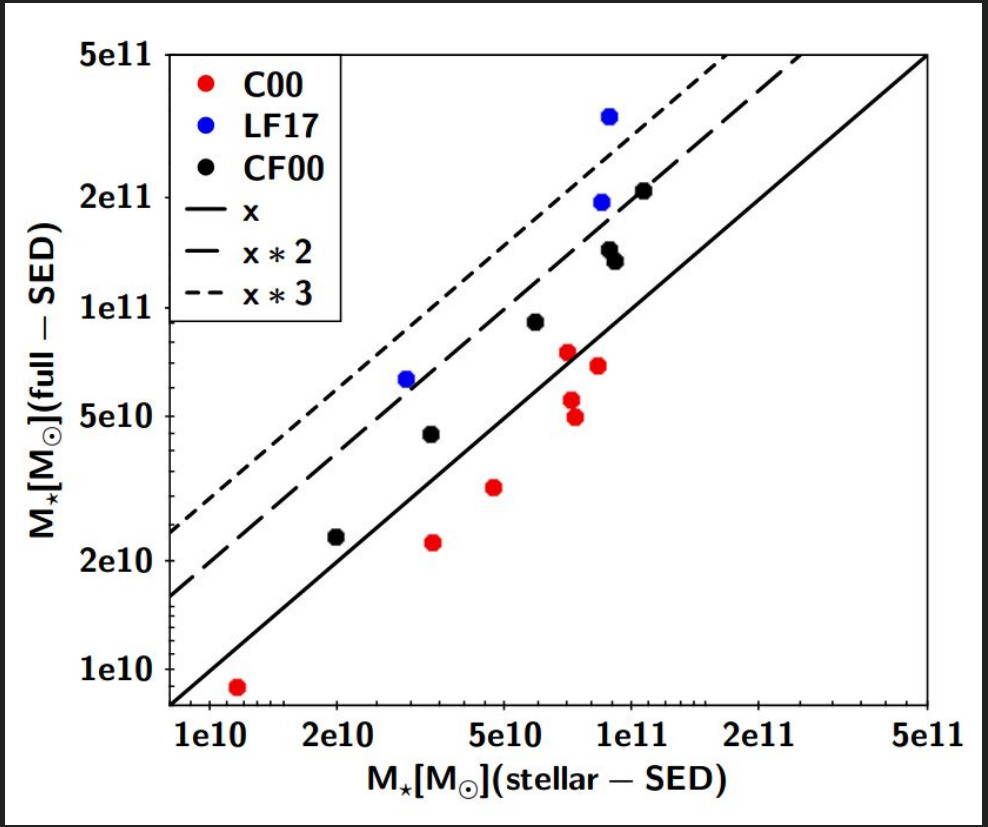


WE NEED CORRECTIONS FOR DUST ATTENUATION



Madau & Dickinson (2014)

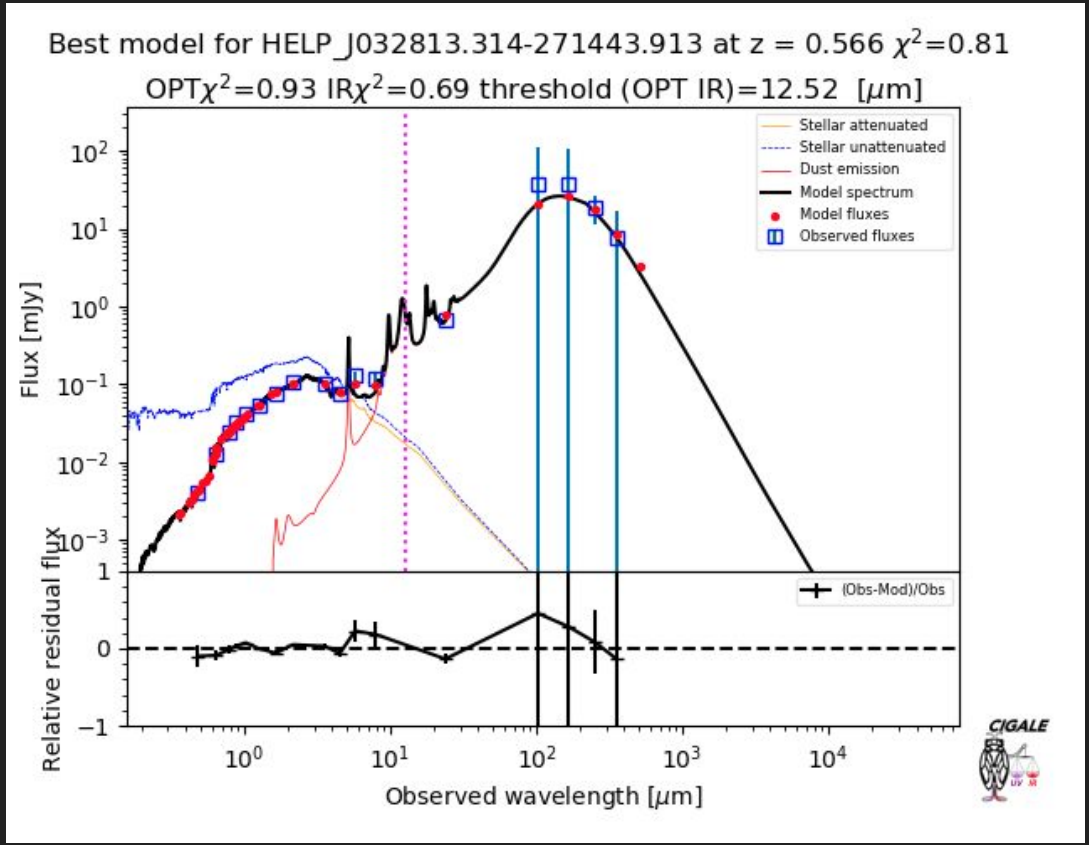
DIFFERENT ATTENUATION LAWS CHANGE MEASUREMENTS OF STELLAR MASS



Baut, V., Ciesla, L., Boquien M., **Małek, K.** (2019)

STATISTICAL STUDIES OF PROPERTIES OF MILLIONS OF GALAXIES FROM HERSCHEL EXTRAGALACTIC LEGACY PROJECT

TO FIND BETTER ATTENUATION LAWS

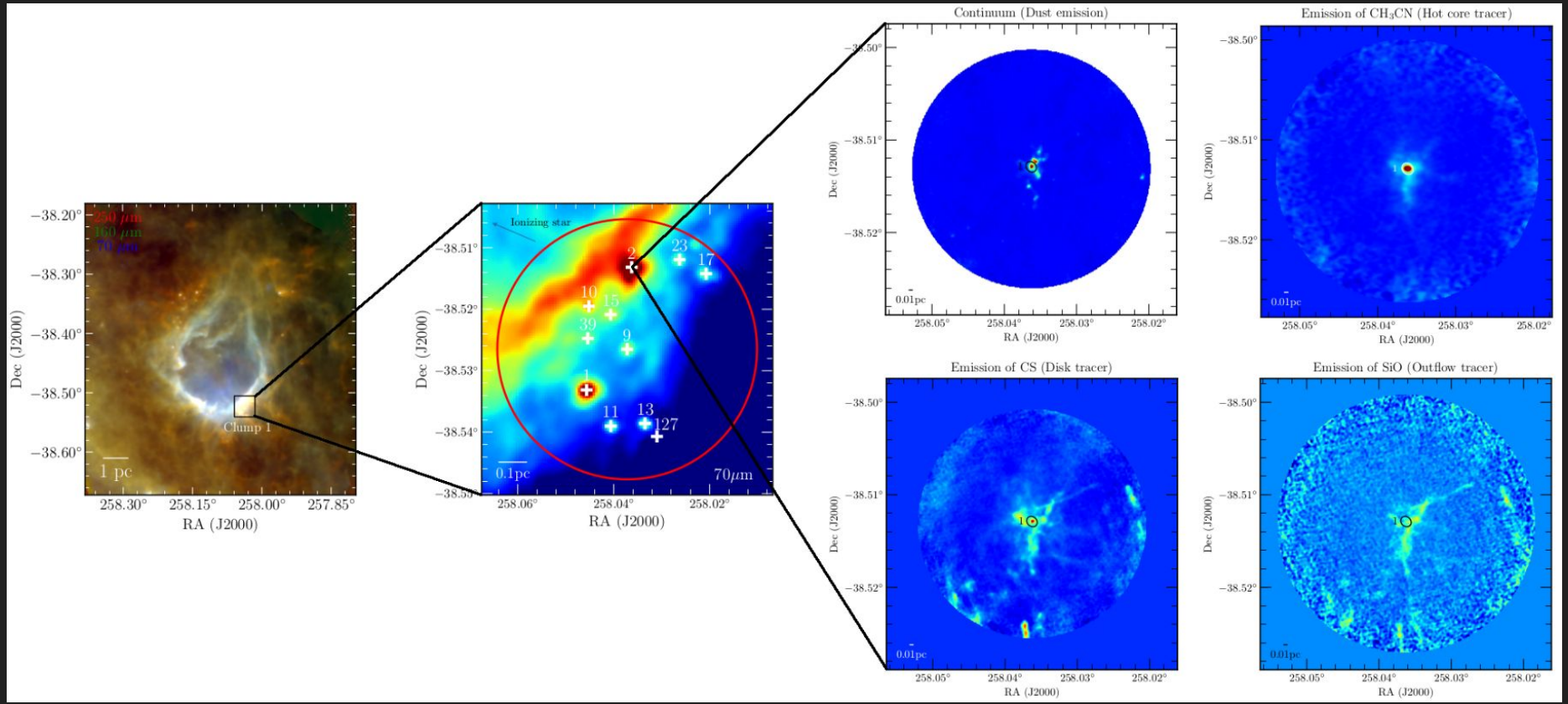


Hamed, M., (in preparation)

WHERE NEW STARS ARE COMING FROM

WORK BY MIGUEL FIGUEIRA

STUDIES OF HII REGIONS



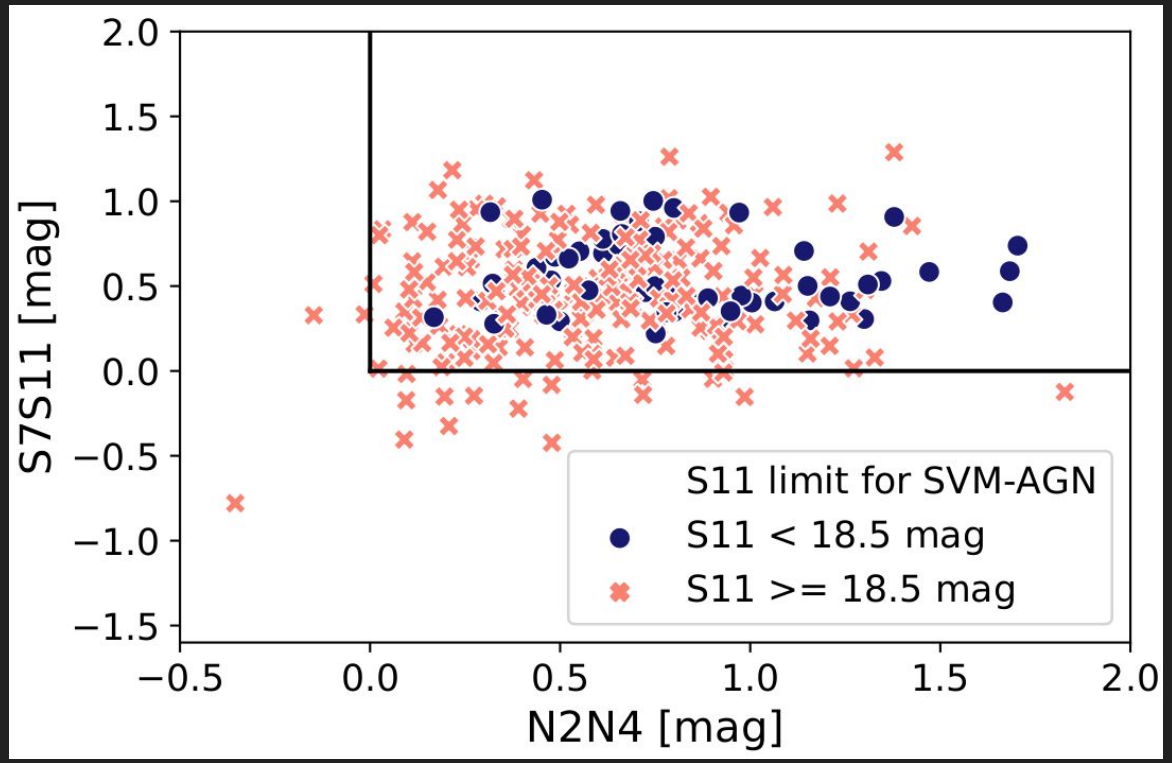
Courtesy of Miguel Figueira

EVOLVING METHODS

MACHINE LEARNING - NEW METHOD OF STUDYING THE UNIVERSE

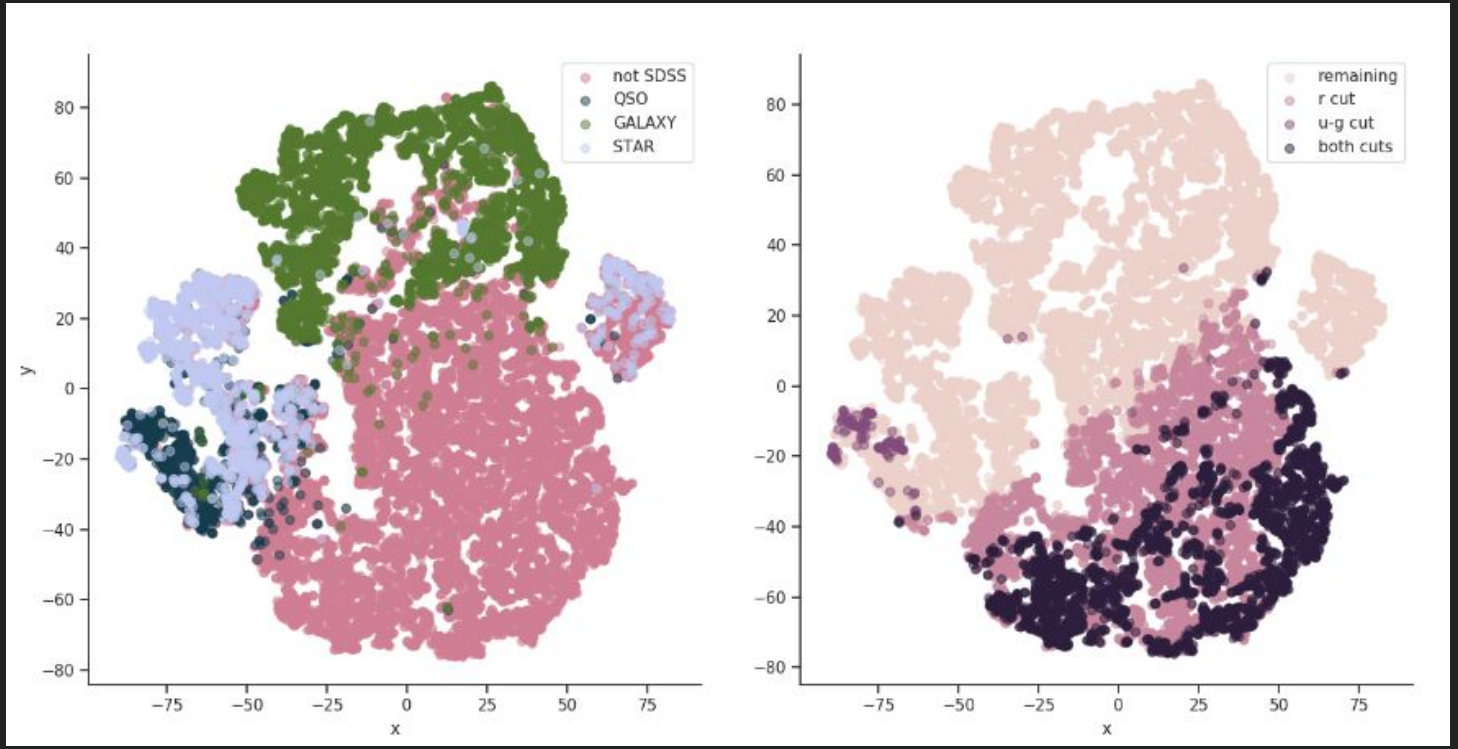
WORK BY ARTEM POLISZCZUK AND SZYMON NAKONECZNY
BASED ON DATA FROM AKARI-NEP AND KiDS

NEW METHODS OF AGN SELECTION ARE IN AGREEMENT WITH ‘OLD ONES’ AND (WHAT IS MORE IMPORTANT) ALLOW US TO FIND NEW OBJECTS



Poliszczuk, A., et al. (2019)

Nakoneczny et al. (2018)

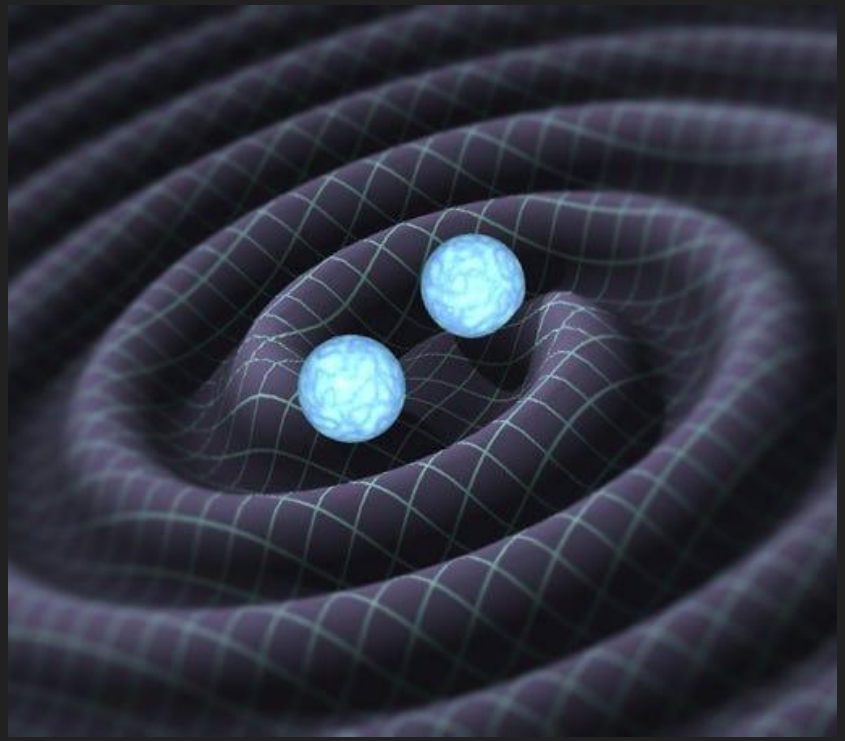


USING MACHINE LEARNING TO CREATE A CATALOG OF QUASARS FROM KILO DEGREE SURVEY (KiDS)

GRAVITATIONAL WAVES - A NEW ERA OF ASTRONOMY

WORK BY ADAM ZADROŻNY AND LIGO-VIRGO COLLABORATION

OPTICAL FOLLOW-UP OF THE GRAVITATIONAL WAVES OBSERVATIONS



INTERNATIONAL COLLABORATIONS

ACTIVE PROJECTS:

1) **AKARI** satellite
2) Galaxy and Mass Assembly (**GAMA**)
3) Herschel Extragalactic Legacy Project (**HELP**)
4) Kilo Degree Survey (**KiDS**)
5) The Large Synoptic Survey Telescope (**LSST**)
6) VIMOS Public Extragalactic Redshift Survey (**VIPERS**)
7) VIMOS Ultra Deep Survey (**VUDS**)

FUTURE PROJECTS:

1) The **SPICA** mission
2) **POLAR2**