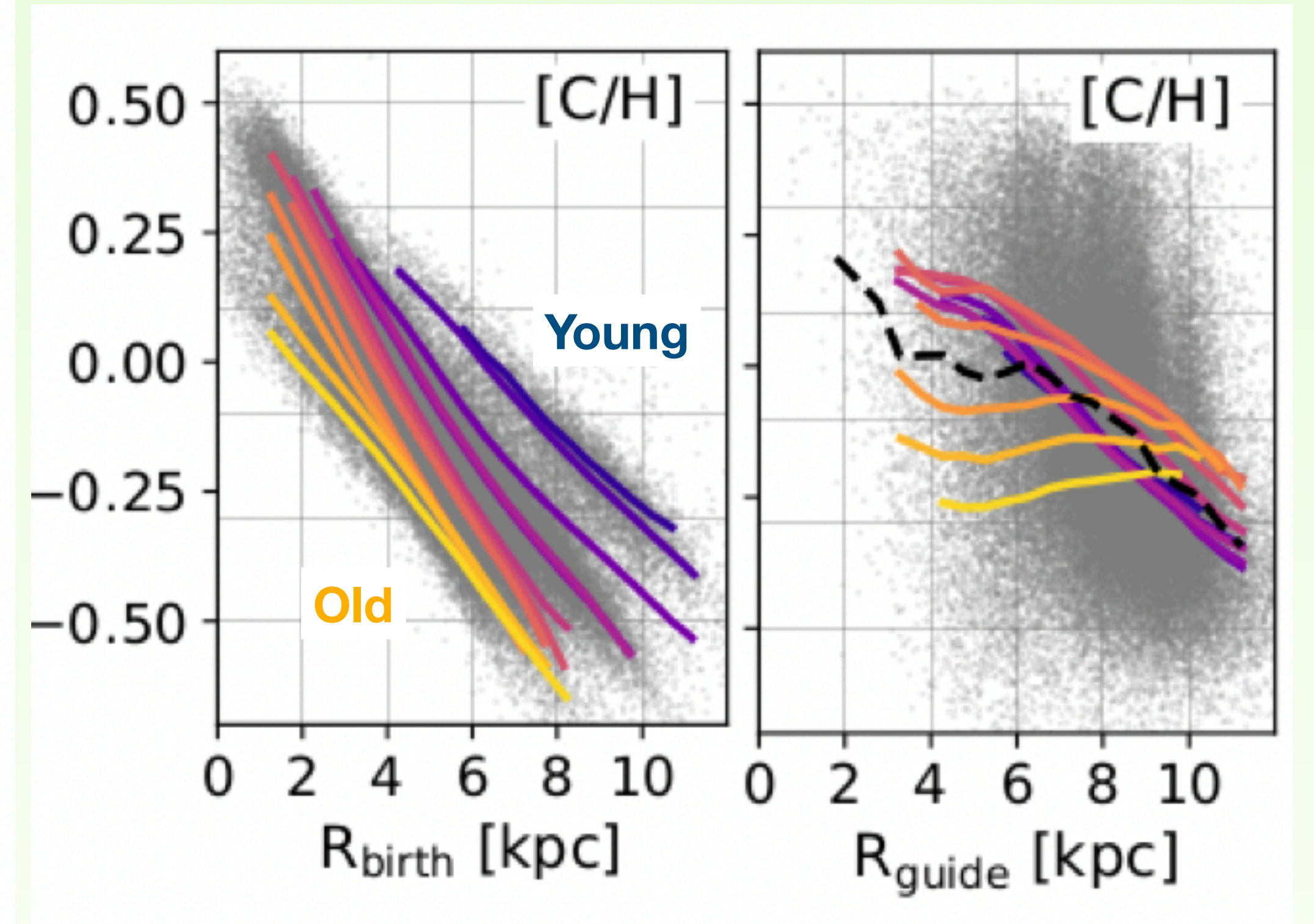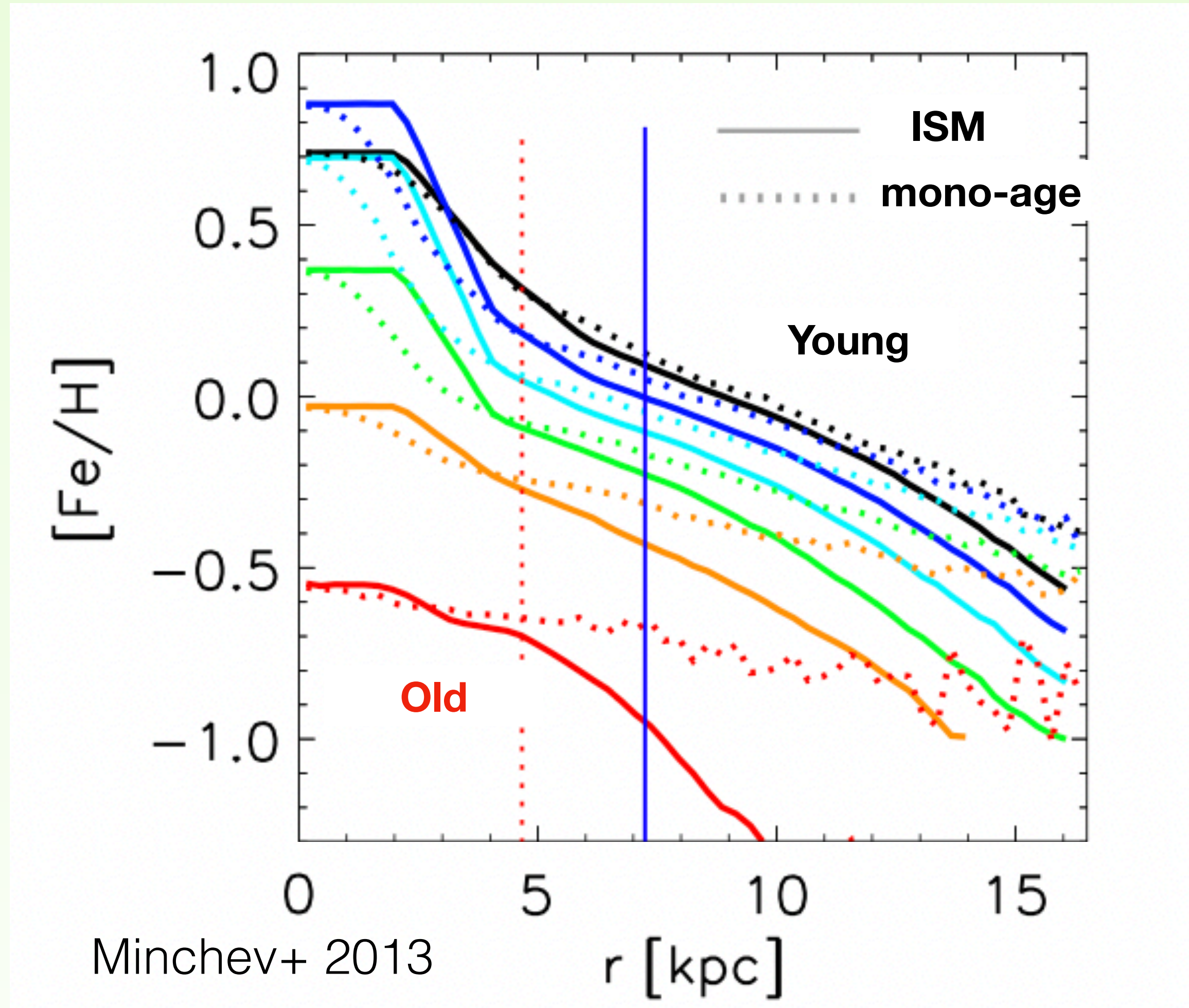# Project 1: What galaxies can we infer birth radii?
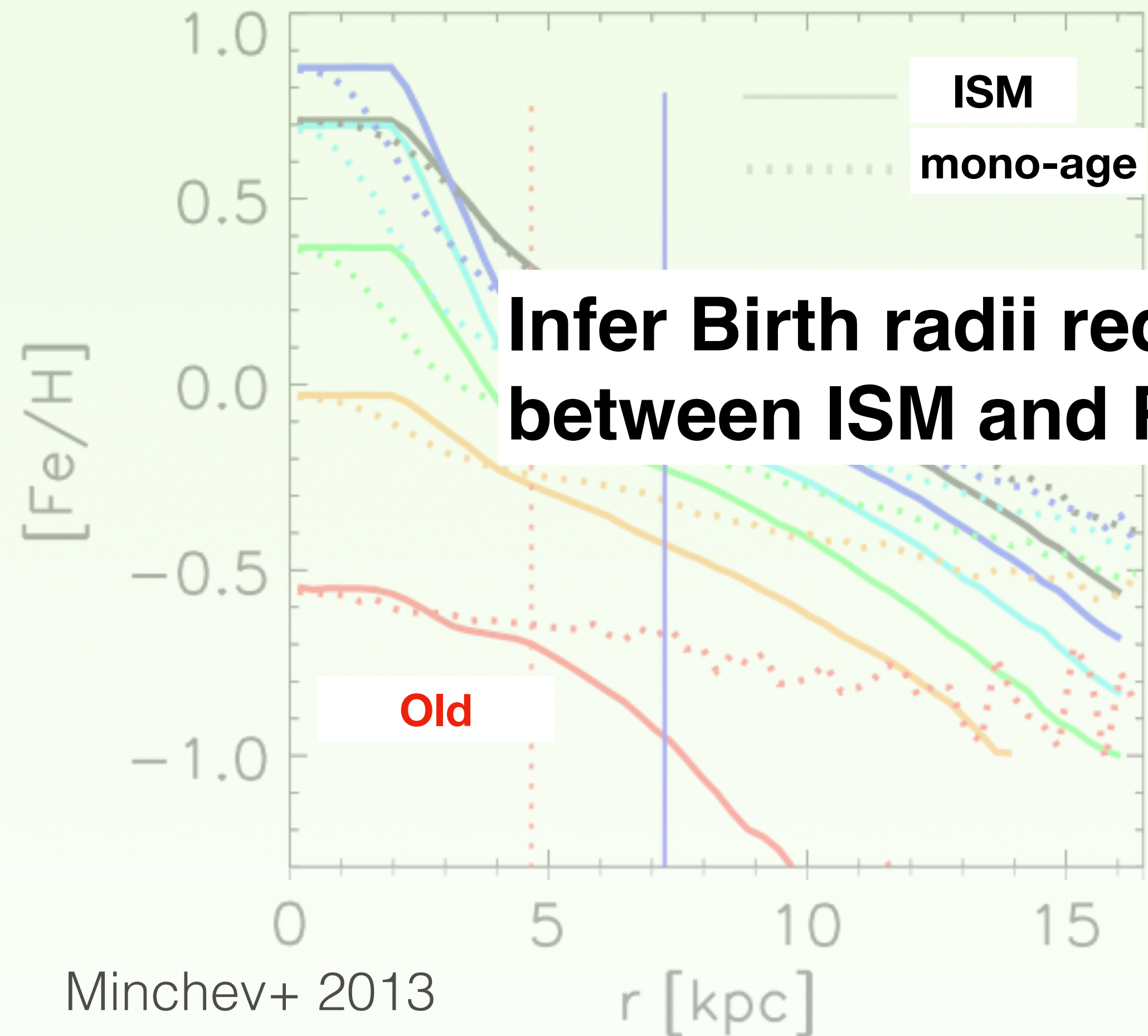
Stellar birth radii: Radial migration and birth radii

- Stars move away from their birth location overtime, infer abundance gradients of the ISM directly from mono-age population is incorrect

Minchev+ 2013

Ratcliffe + 2023

Lucy Lu: yl4331@columbia.edu, Twitter: @LucyYuxi

Stellar birth radii: Radial migration and birth radii

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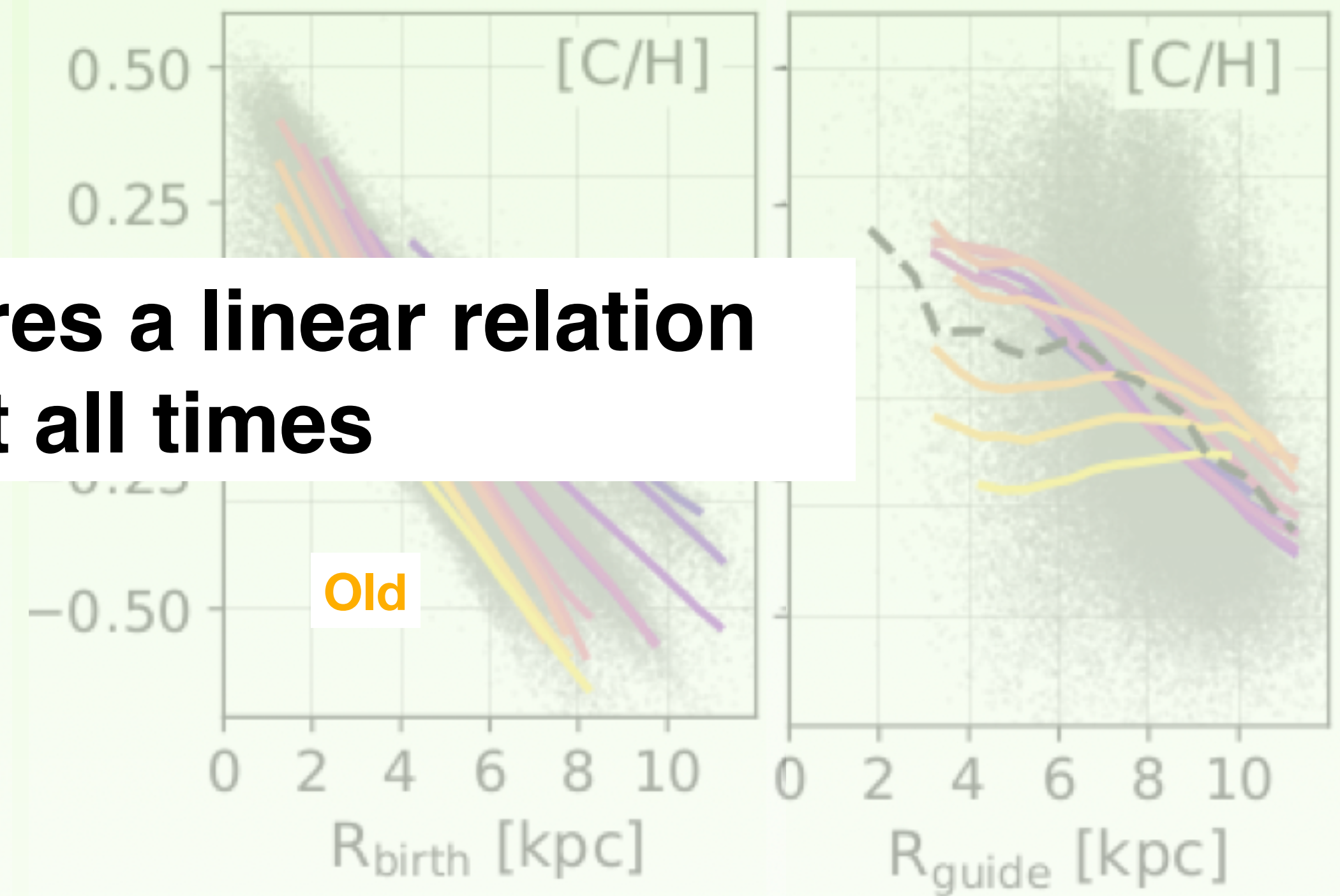

ISM
mono-age

Infer Birth radii requires a linear relation between ISM and R at all times
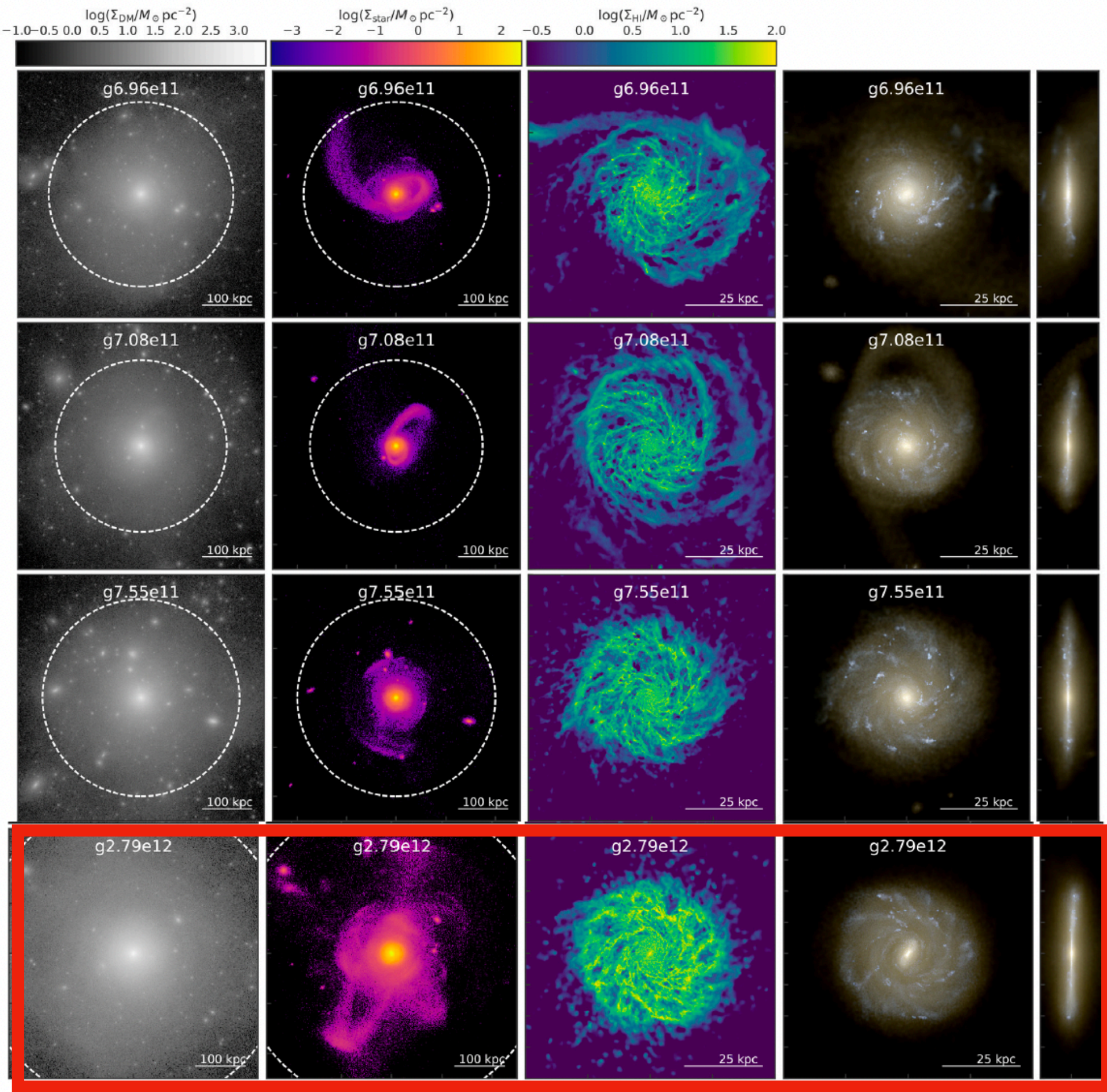
Old

Minchev+ 2013

Ratcliffe + 2023
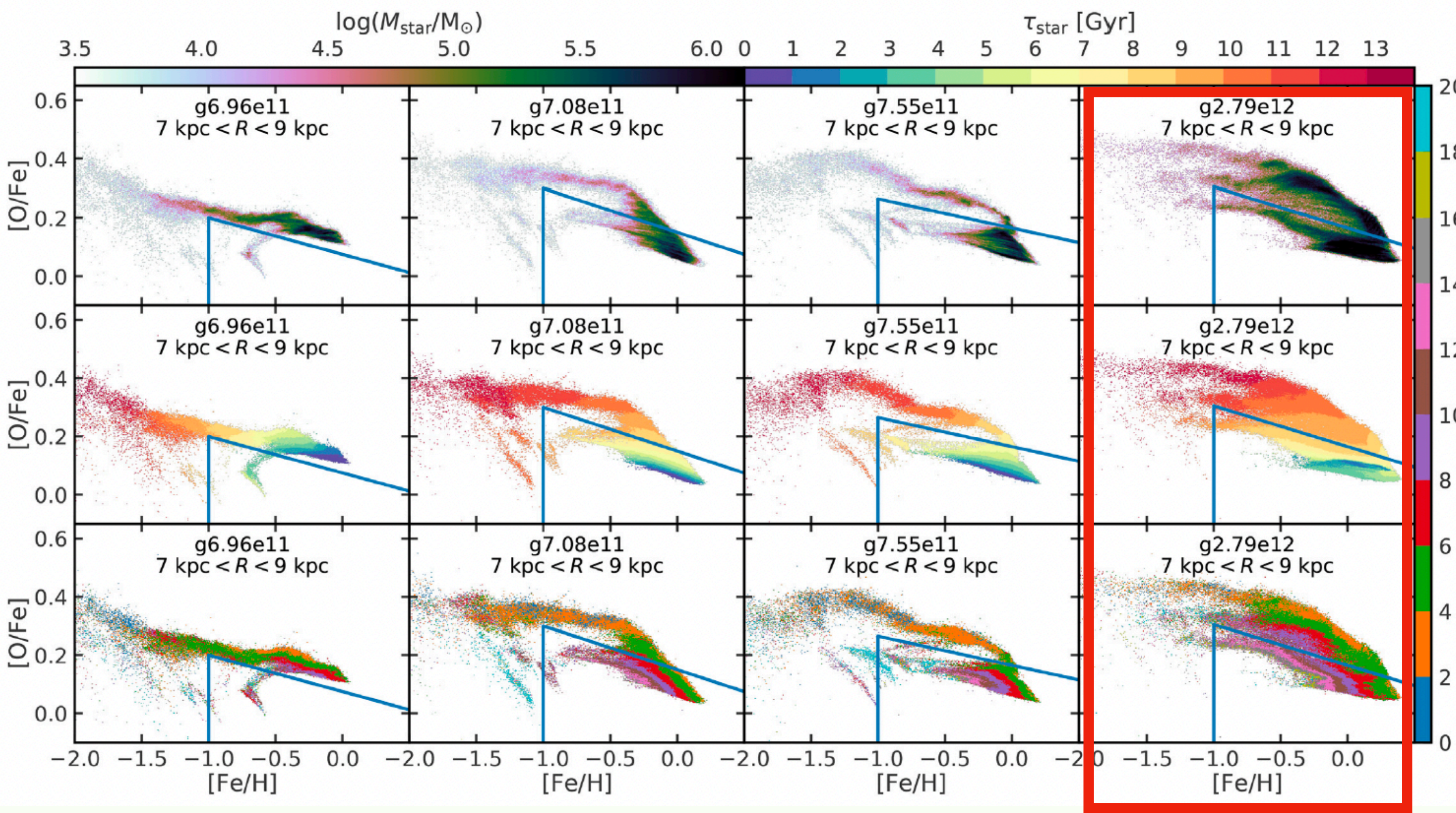
Lucy Lu: yl4331@columbia.edu, Twitter: @LucyYuxi

Stellar birth radii: Radial migration and birth radii

Tool

- NIHAO-UHD Cosmological simulations (Buck+ 2018)

Buck+ 2020

Buck 2020b

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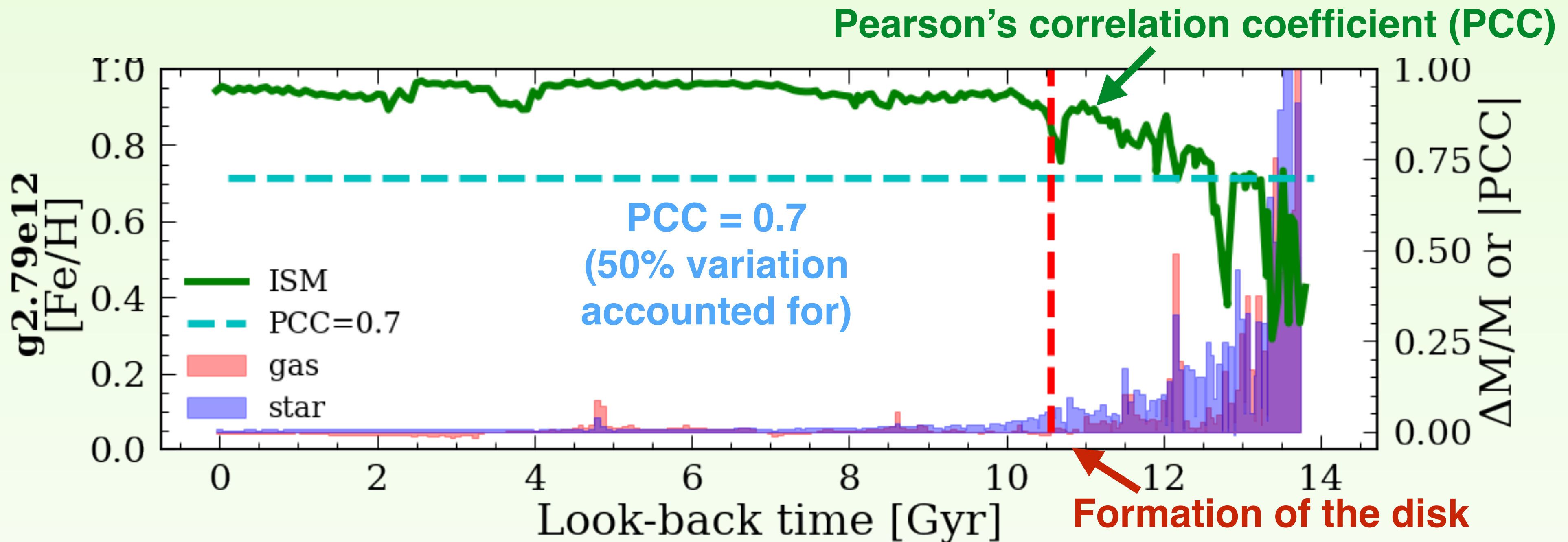# **Stellar birth radii**: Reliability in obtaining birth radii

Q1: When do the assumptions hold in MW-like galaxies?

Lu+ 2022c

Lucy Lu: yl4331@columbia.edu, Twitter: @LucyYuxi

Stellar birth radii: Reliability in obtaining birth radii

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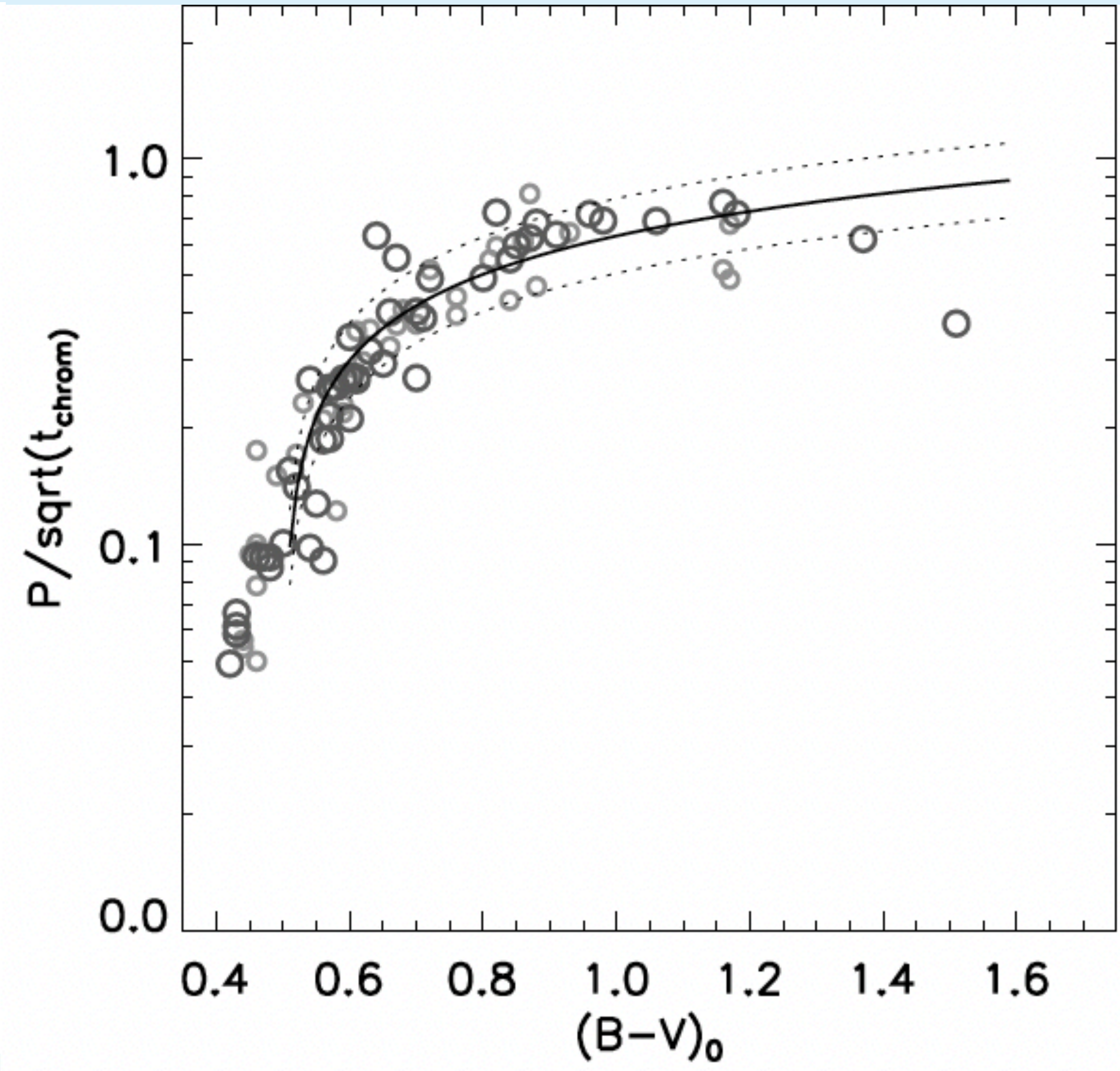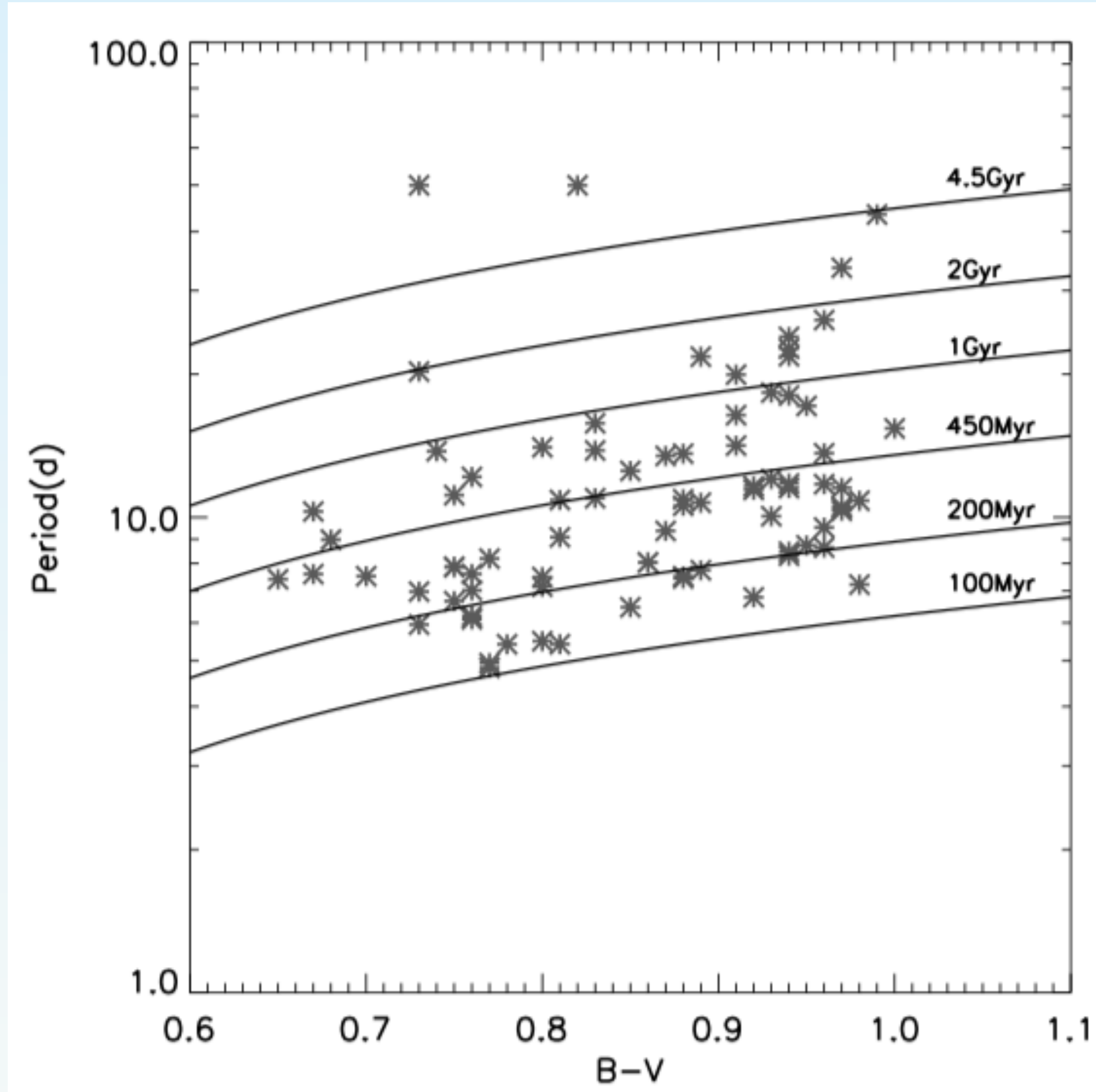

Pearson's correlation coefficient (PCC)

True after the disk started to form

Formation of the disk
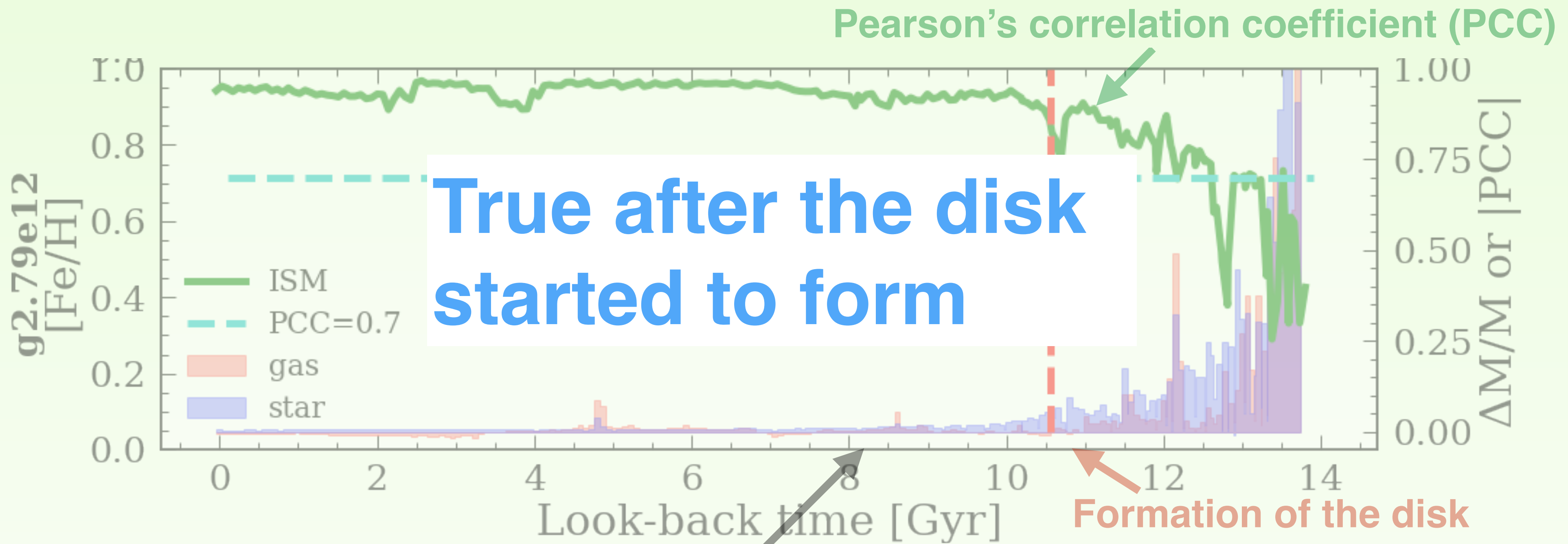
Formation of the bar

Lu+ 2022c

Lucy Lu: yl4331@columbia.edu, Twitter: @LucyYuxi

Stellar birth radii: Reliability in obtaining birth radii

Lu+ 2022c

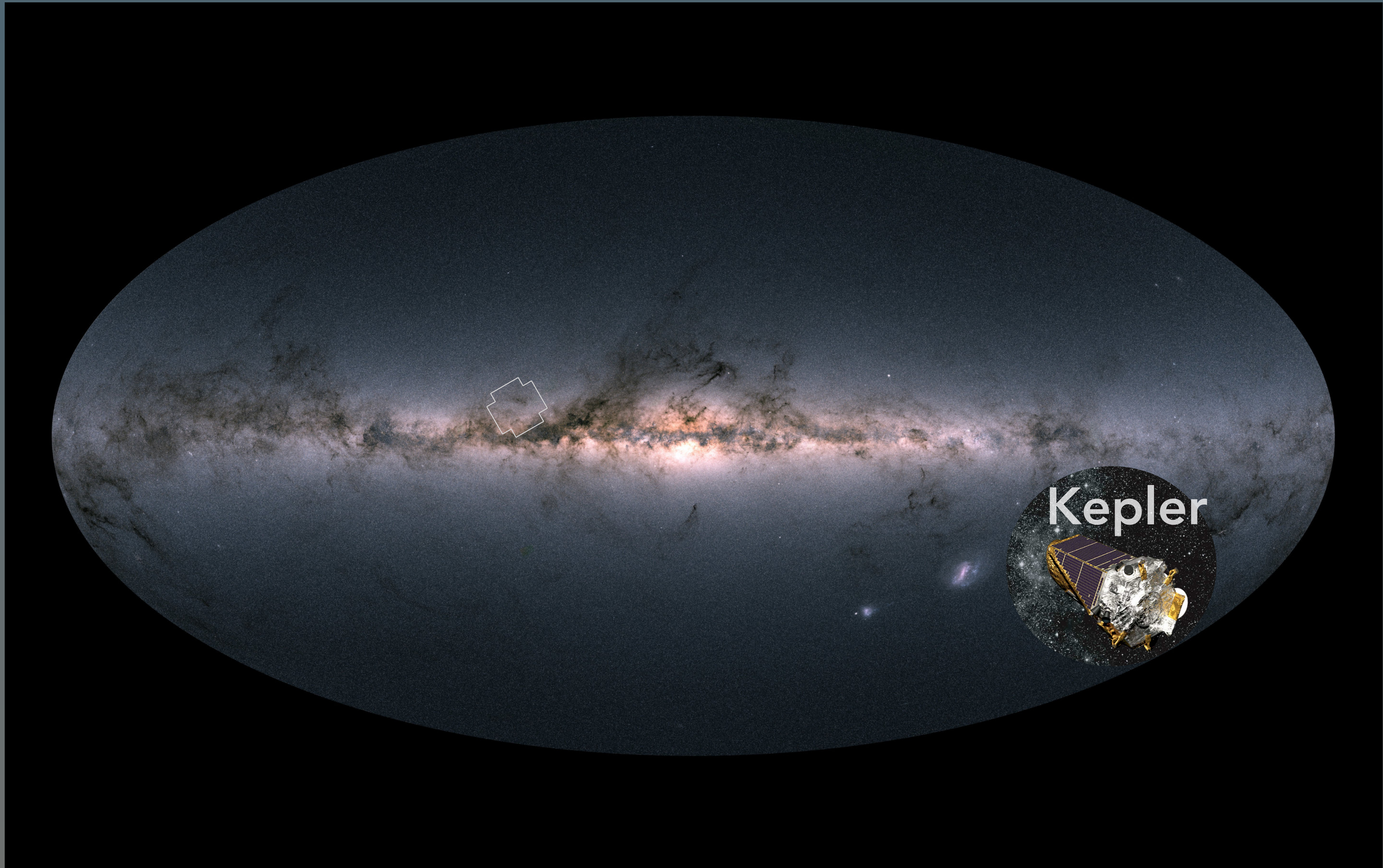Lucy Lu: yl4331@columbia.edu, Twitter: @LucyYuxi
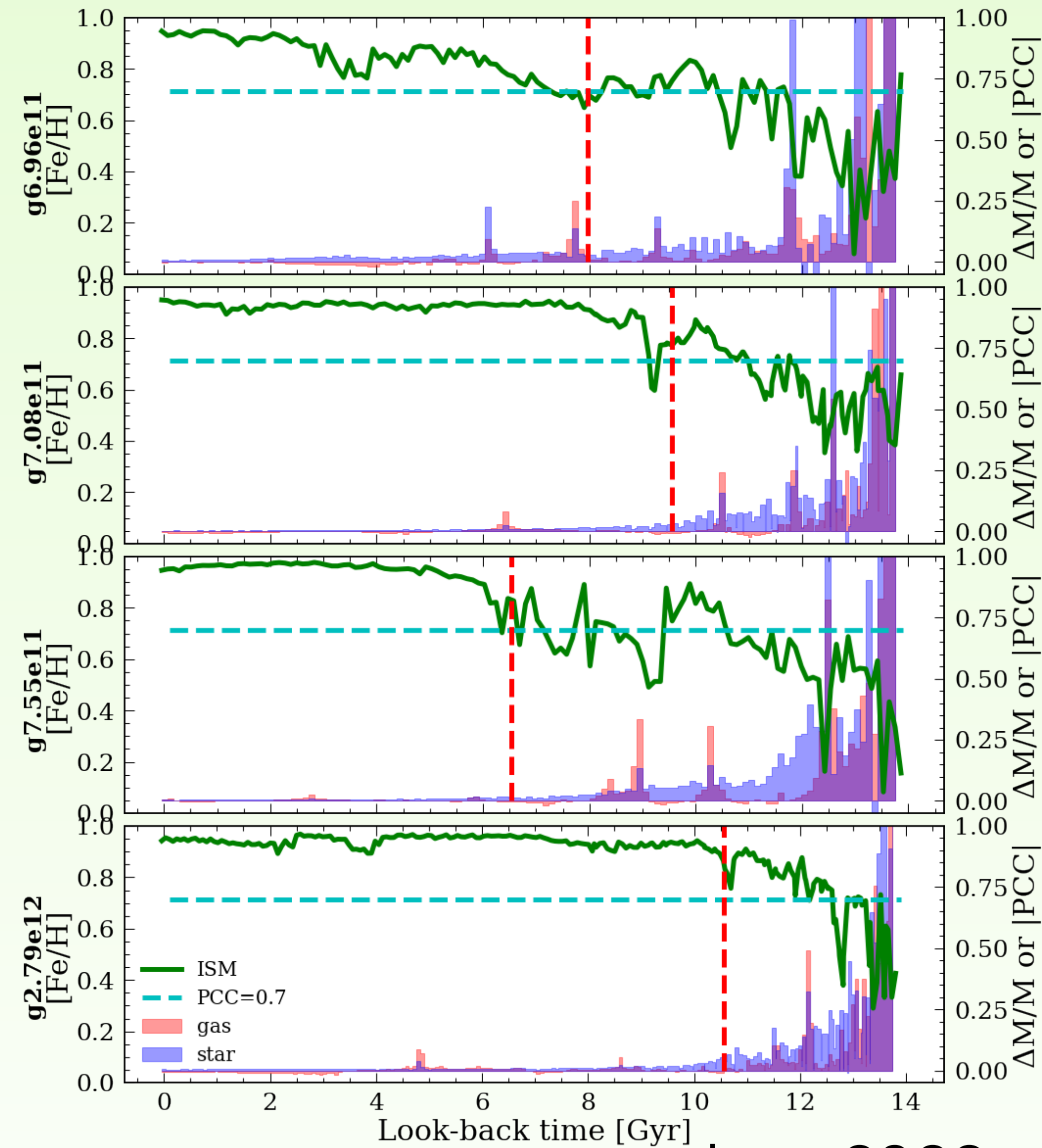
Project 2: Understanding stellar spin-down using Galactic kinematics

Stellar ages: Gyrochronology

Barns 2007

Kepler

Stellar ages: Gyrochronology

Kepler (McQuillan+ 2014)

Things are not as simple as we thought!
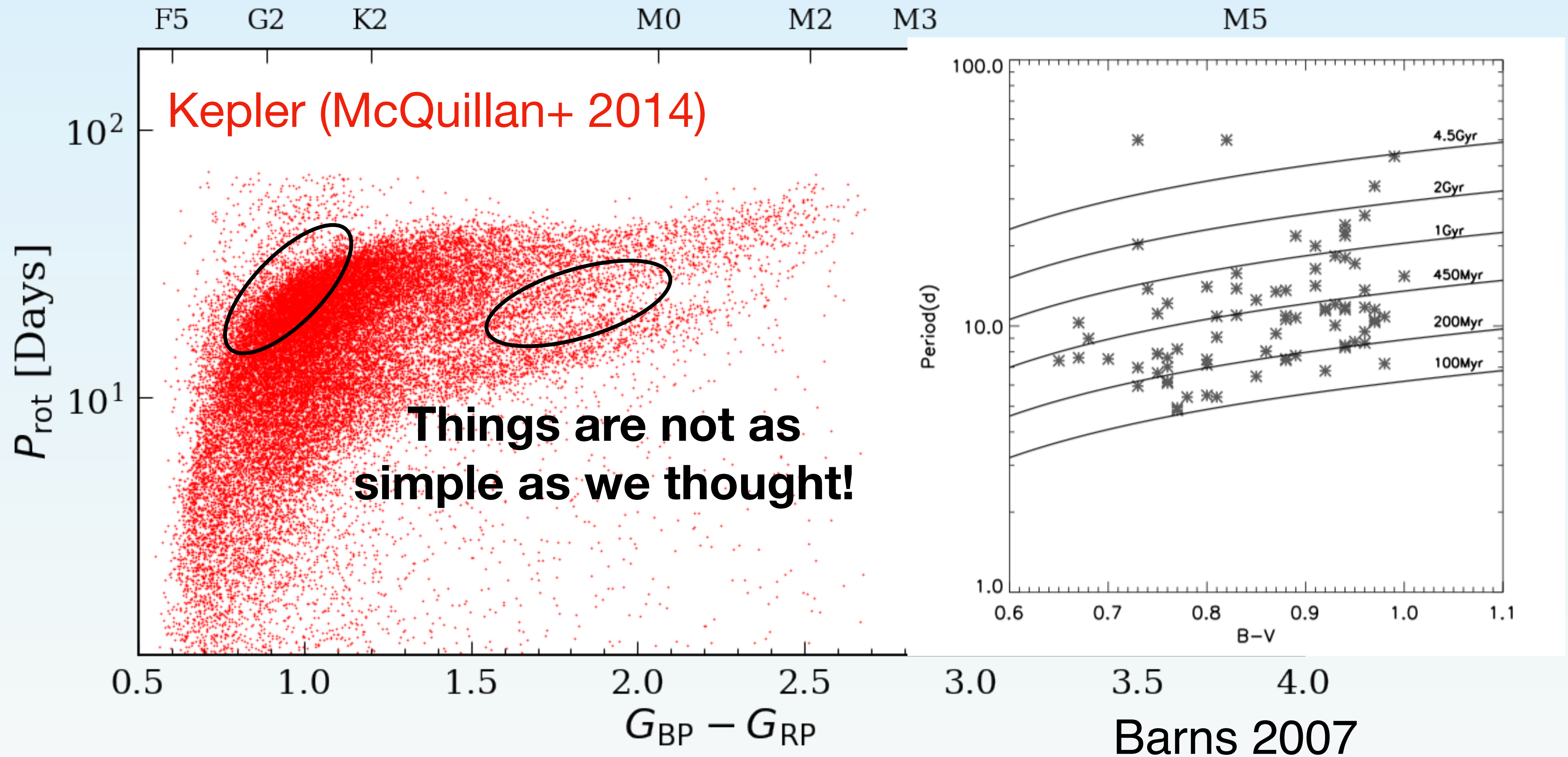
Barns 2007

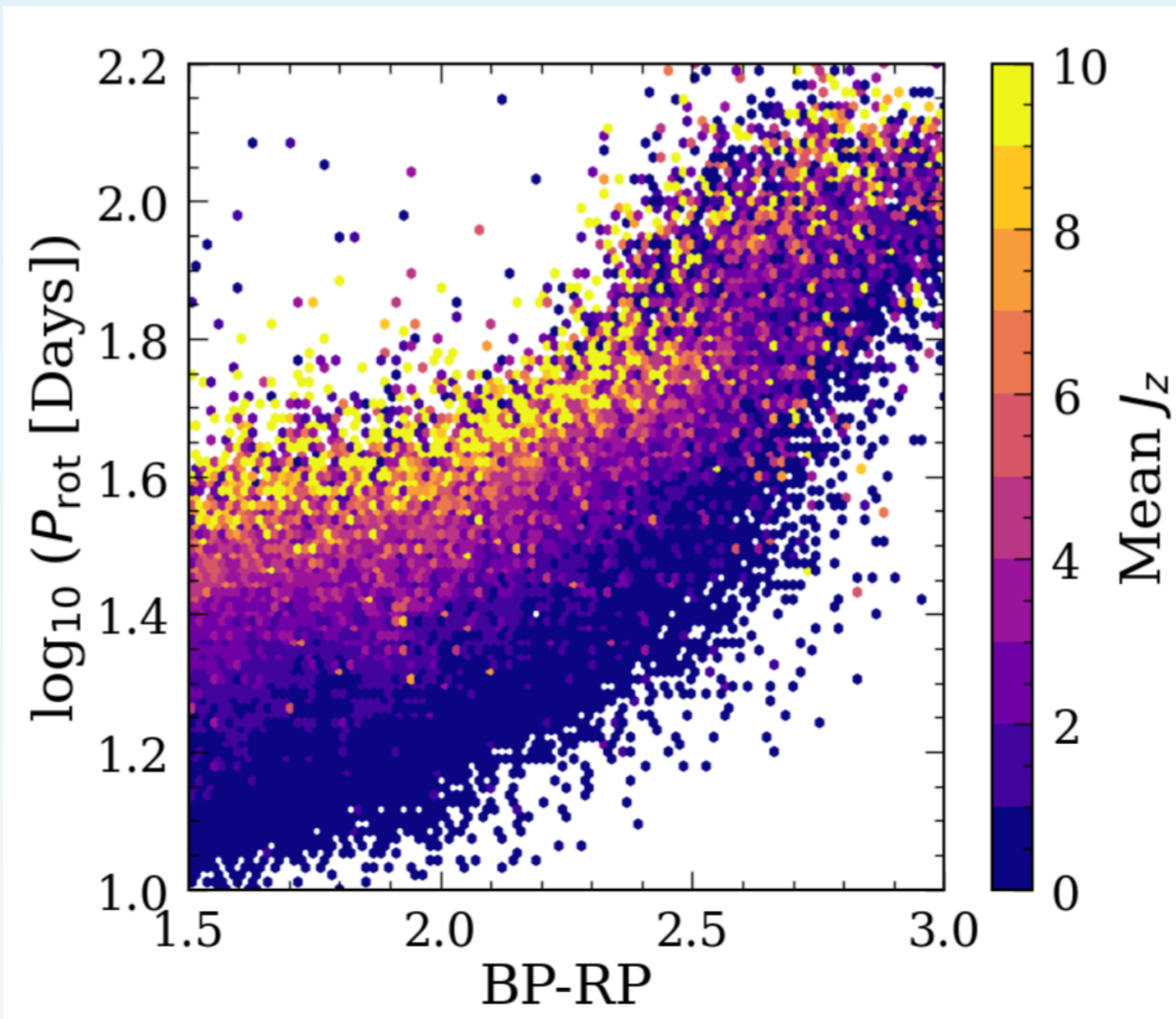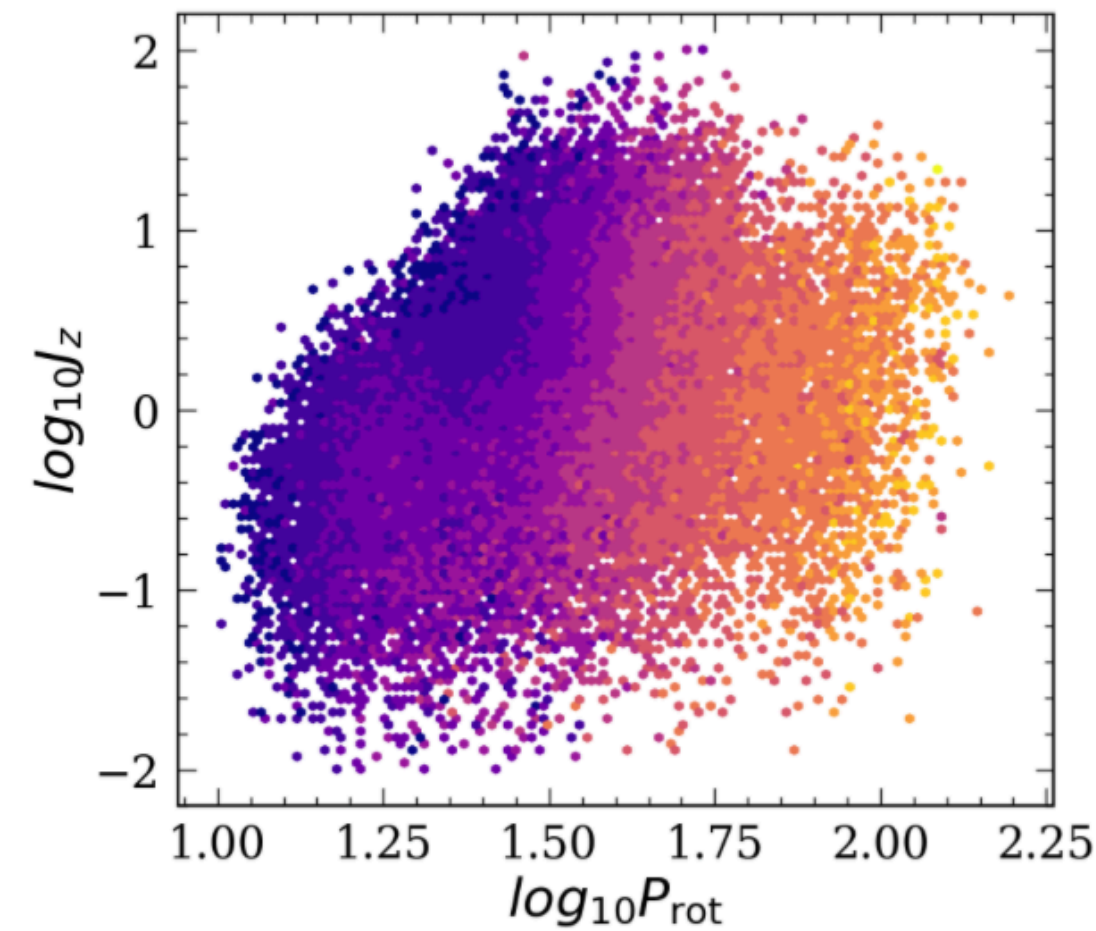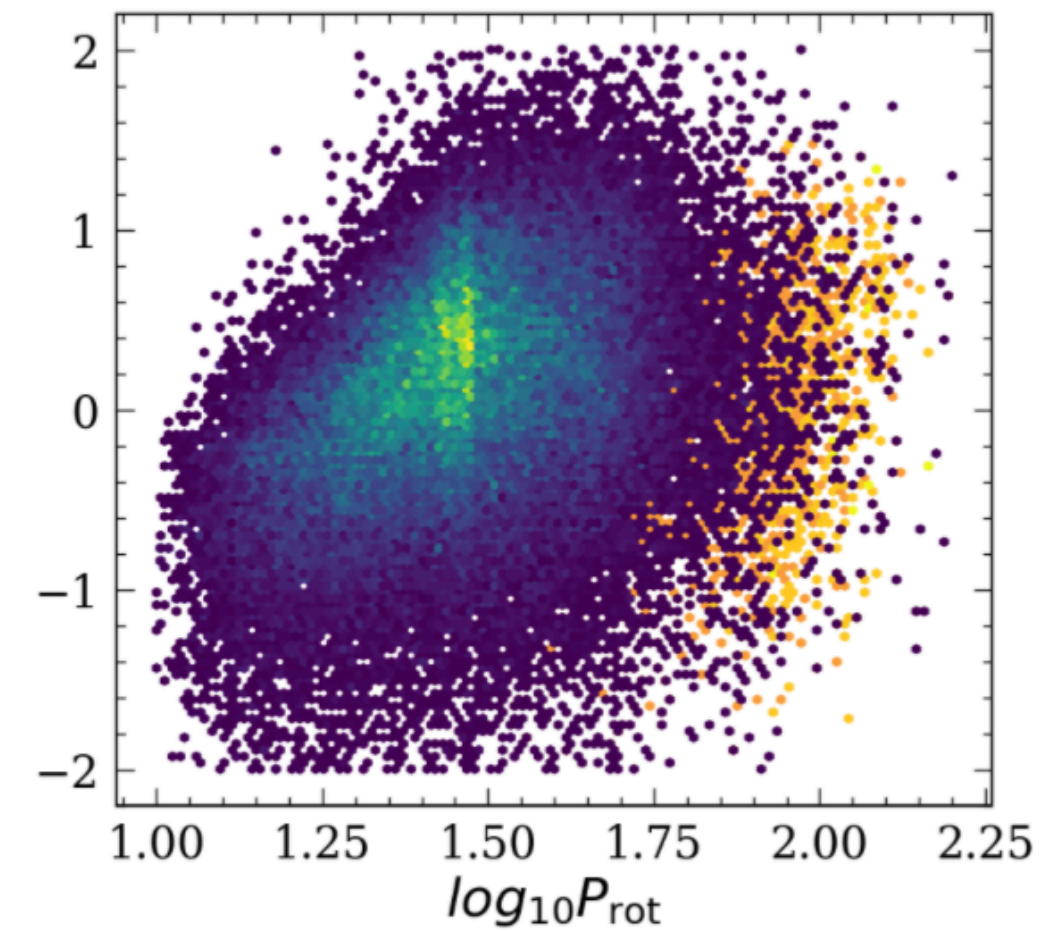# **Stellar ages**: Using Jz as age proxy to understand stellar spin-down

All stars

Partially convective stars

Fully convective stars