



# Seven Samurai

# Seven Stars



# Stellar Archeology as a Time Machine



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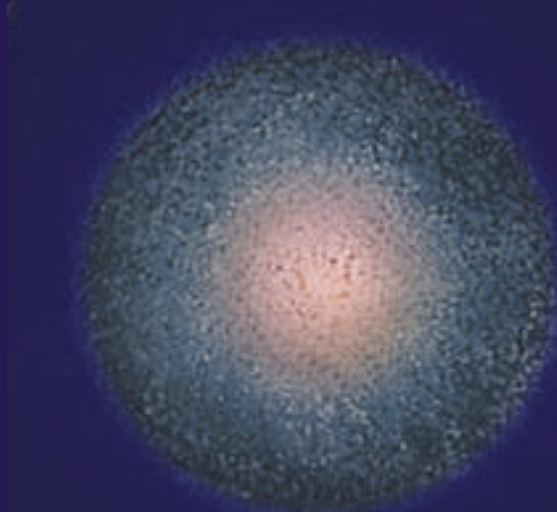
# Formation and evolution of the early generation of stars and galaxies

## Theory

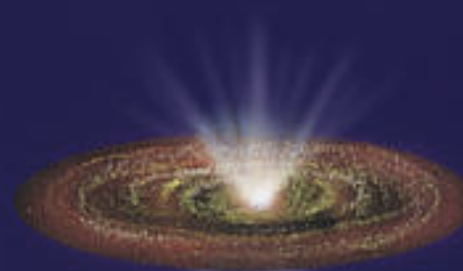


# STAR FORMATION

molecular cloud



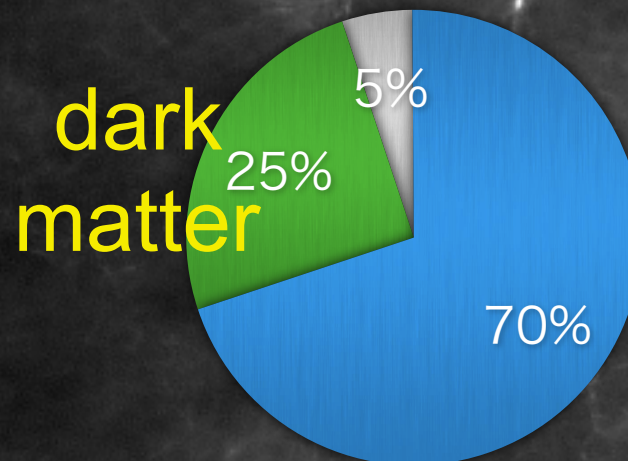
protostar



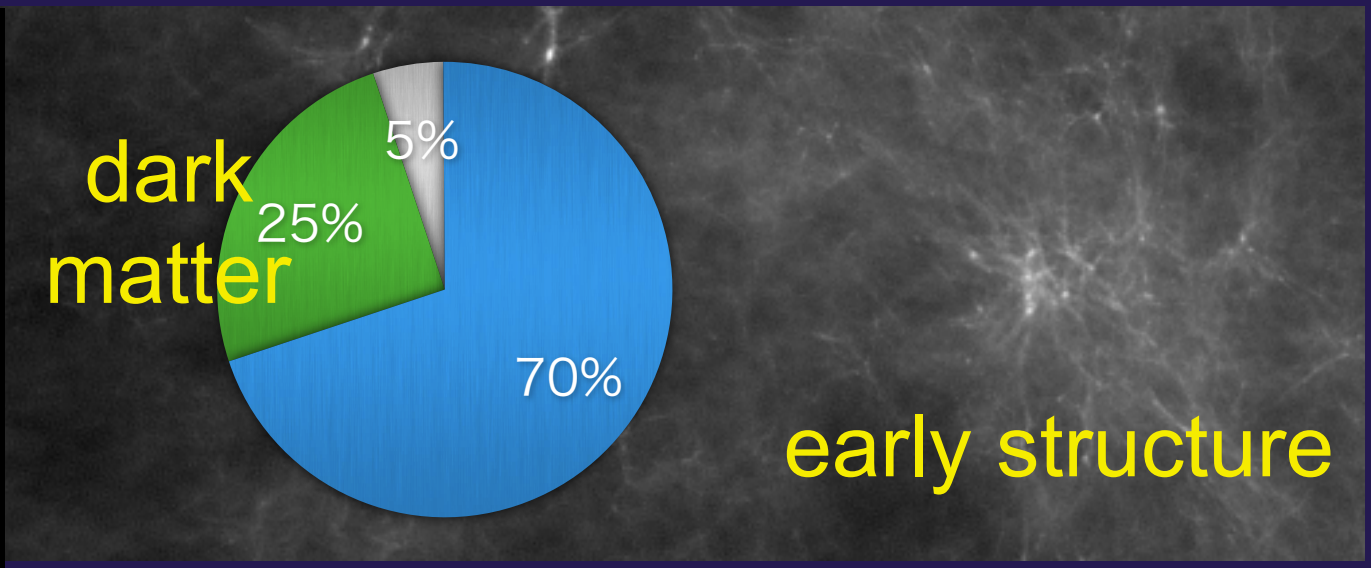
star



## STANDARD COSMOLOGICAL MODEL



early structure





## **Low-mass star formation**

EMP stars and old stars

Multiple enrichment modes

## **Massive star evolution**

Inhomogeneous mixing

Rotation/B-field

## **Binary formation and evolution**

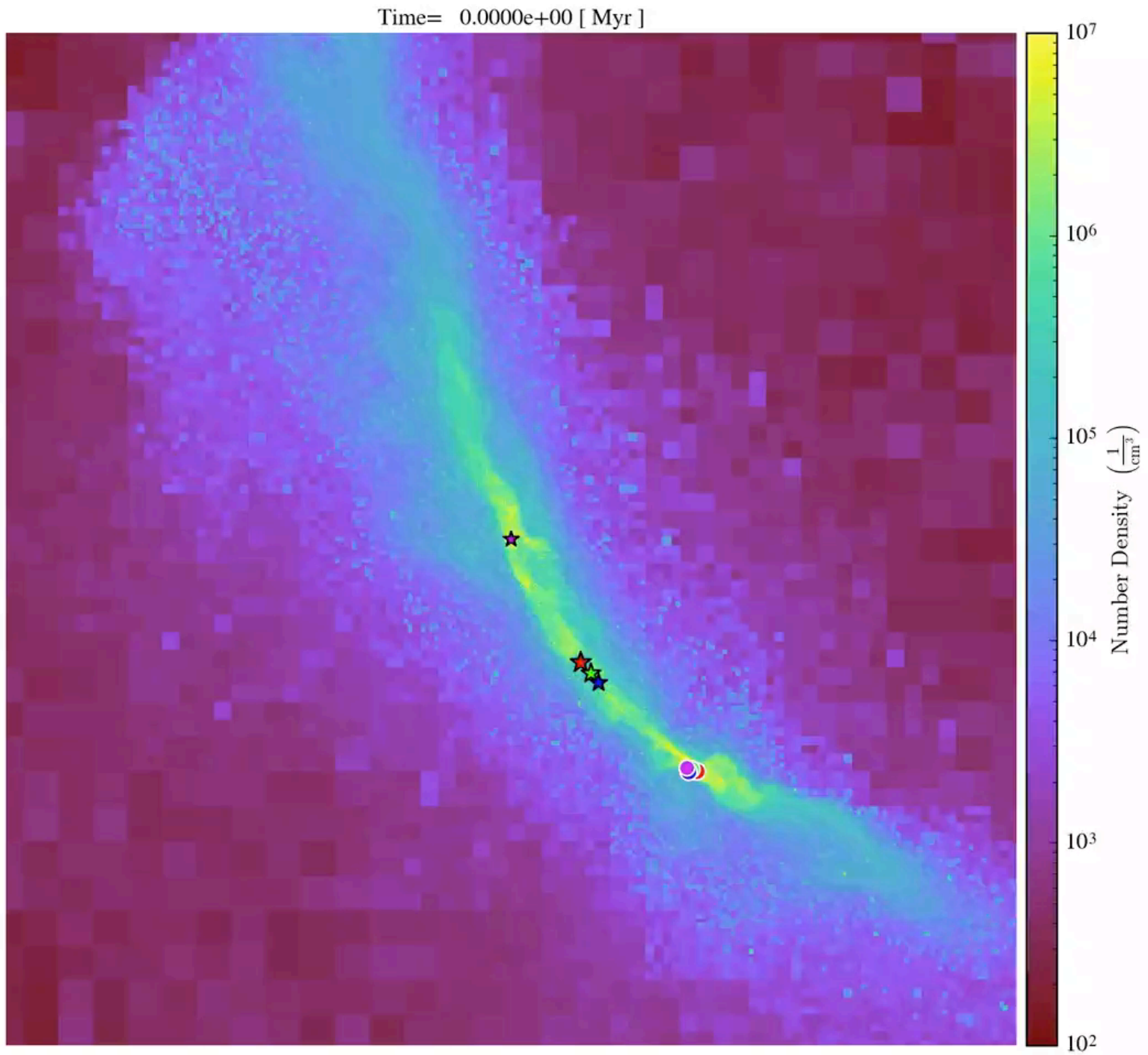
Mass transfer on CEMPs

Massive binaries and BHs as LIGO sources

NS binaries and r-process

Stellar dynamics





Sakurai, Hirano, Fujii

# Primordial IMF - The Holy Grail -

Theorists say very massive PopIII stars can form,  
but there has been no clear evidence for PISN  
- what does this mean ?

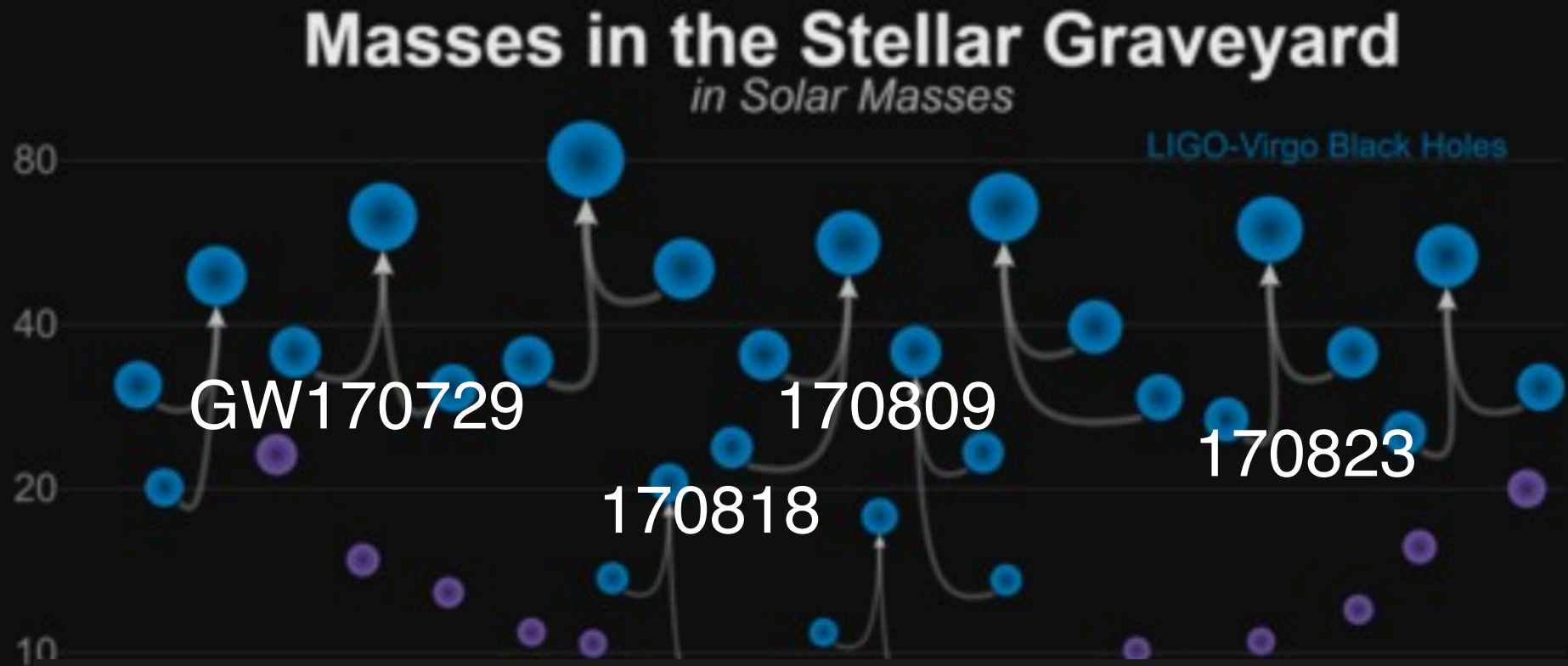
Theorists also say primordial gas disks fragment,  
but there have been no zero-metallicity stars  
discovered in the Galaxy  
- what does this mean ?

Theorists often say JWST can prove their theory  
- when does this happen ? 2021 ?

*Explore possibilities to the maximum extent,  
before discoveries / observations*

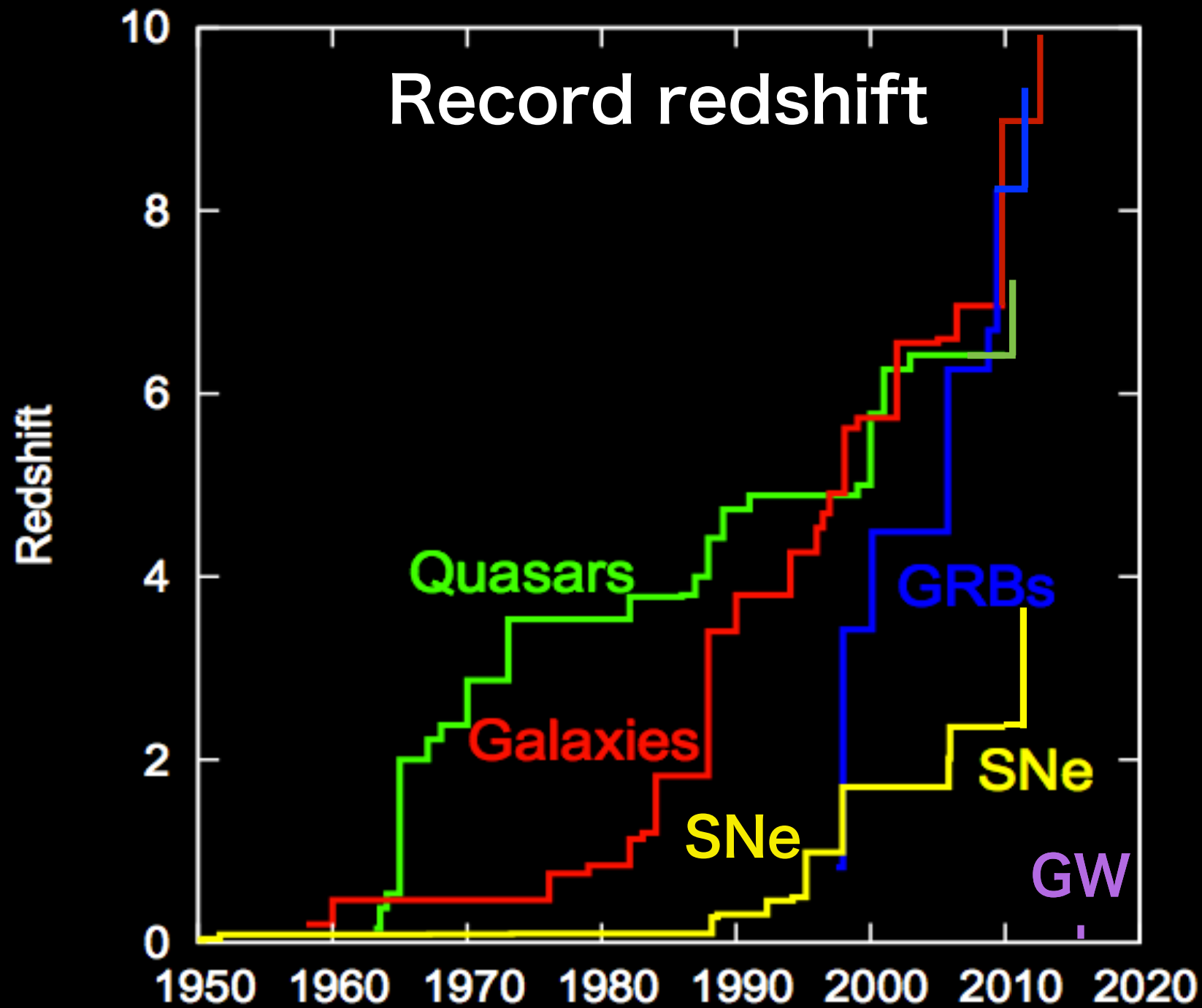


*...and who ordered these ?*



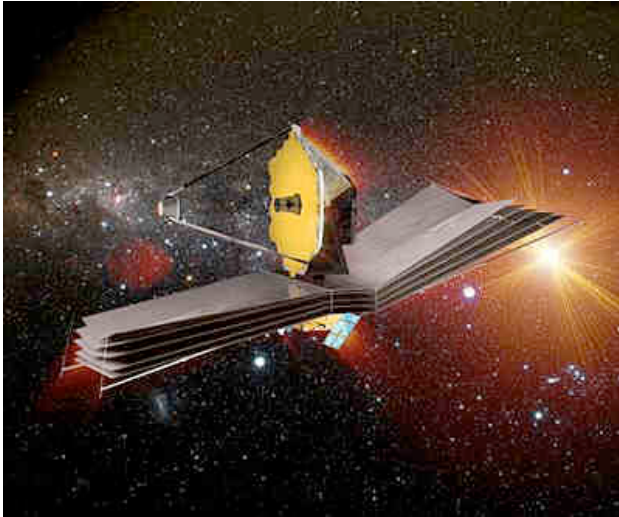
This may not be of PopIII origin,  
but is at least closely related to  
low- $Z$  star formation and evolution

# We can ride on another time-machine

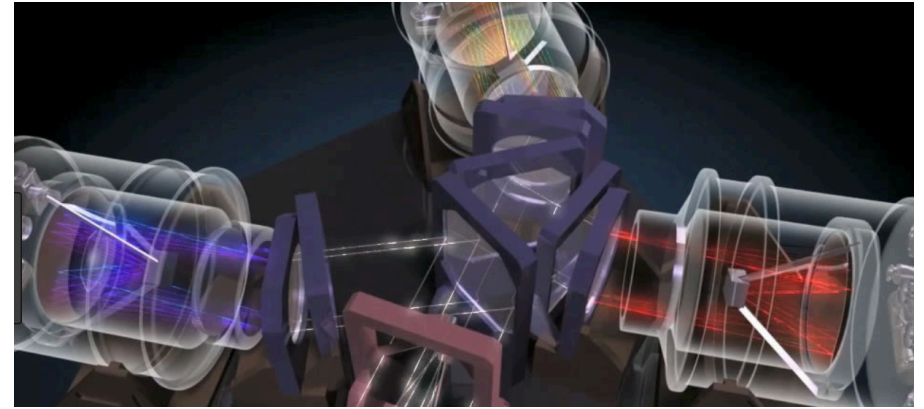


# In the near future...

JWST 2020-



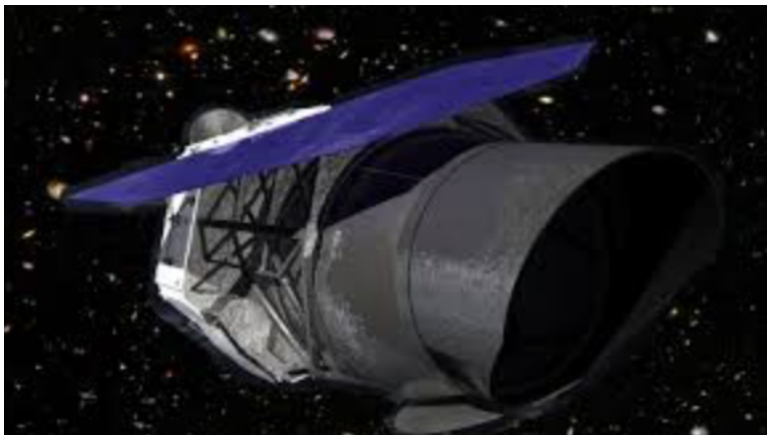
2019- Subaru PFS



2024-  
TMT, E-ELT



2027-  
WFIRST



2025-  
SKA



*Early Universe, Time Domain, Archeology*