Stellar Populations at Low-Metallicity via Nearby Star-Forming Galaxies

Peter Senchyna
Dan Stark
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Reionization Epoch
Aspen Center for Physics

image: NASA, ESA, and A. Aloisi (STScI)
CIII], CIV at z~6-7: what is producing this ionizing flux?
we need:

- more data at low metallicity
- constraints on HeII, CIV
Cycle 23 HST/COS program (PI: Stark)

12 + log(O/H) = 7.73
7.84
7.95
8.03
8.14

7.77
7.88
8.03
8.10
8.19

Hell emitters from
Shirazi+Brinchmann 2012

5.5 < log M* < 8.5
log (Hell/Hbeta) ~ -2
6 without WR bumps in SDSS
extreme tail of star-forming galaxies
WR signatures often absent in the optical at low-metallicity
COS data provides:

key nebular emission lines
- [CIII], [HeII], [OIII], [CIV]

massive star features
- [CIV] P-Cygni (O stars), [HeII] (WRs)
- additional metallicity indicators (Rix+2004)

ISM/CGM absorption lines
- [CIV], [SIII]
COS data!

400 pc
40 pc!
stellar metallicity constraints

$Z = 0.003 - 0.008$; nebular: $Z = 0.005$ ($\sim Z_{\text{Sun}}/3$)
population synthesis models are uncertain; esp. in ionizing flux predictions
more 'WR-like' stars

decreasing metallicity
we can anchor these models locally
multiwavelength data (COS, Chandra, MMT)

empirical templates for J WST
questions?
170 ks of Chandra archival data
typical FOS CIV profile