

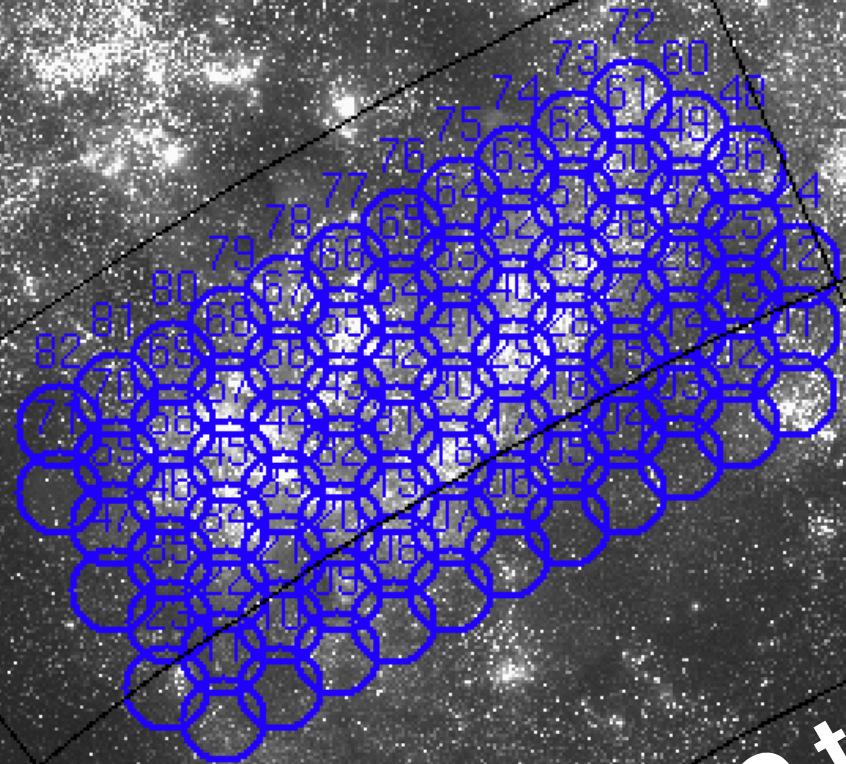
ULTRAVIOLET ASTRONOMY IN THE XXI CENTURY



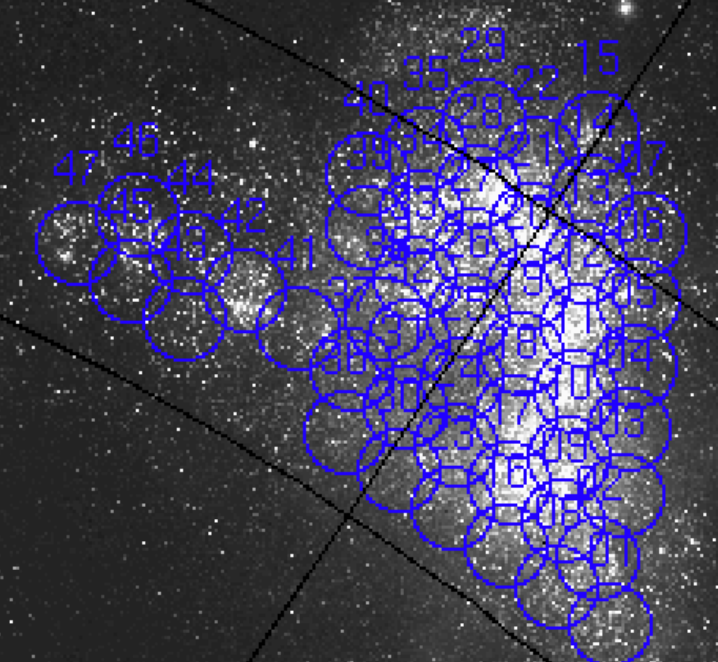
e-Workshop 2020 – October 27-29

A First-look Astrosat/UVIT FUV Survey of the Small Magellanic Cloud (SMC)

D. Thilker, L. Bianchi (JHU), J. Hutchings (NRC Herzberg) J. Postma (U.Calgary)



...and LMC too!



Science Motivation

FUV spectral coverage → reliable identification of hot M.S. stars
Combined w/ NUV+opt. phot. → stellar T_{eff} and extinction law constraint
First FUV survey of the MCs @ 1" resolution → mitigates source blending
Integrated FUV phot. for reference set of low metallicity, known age clusters

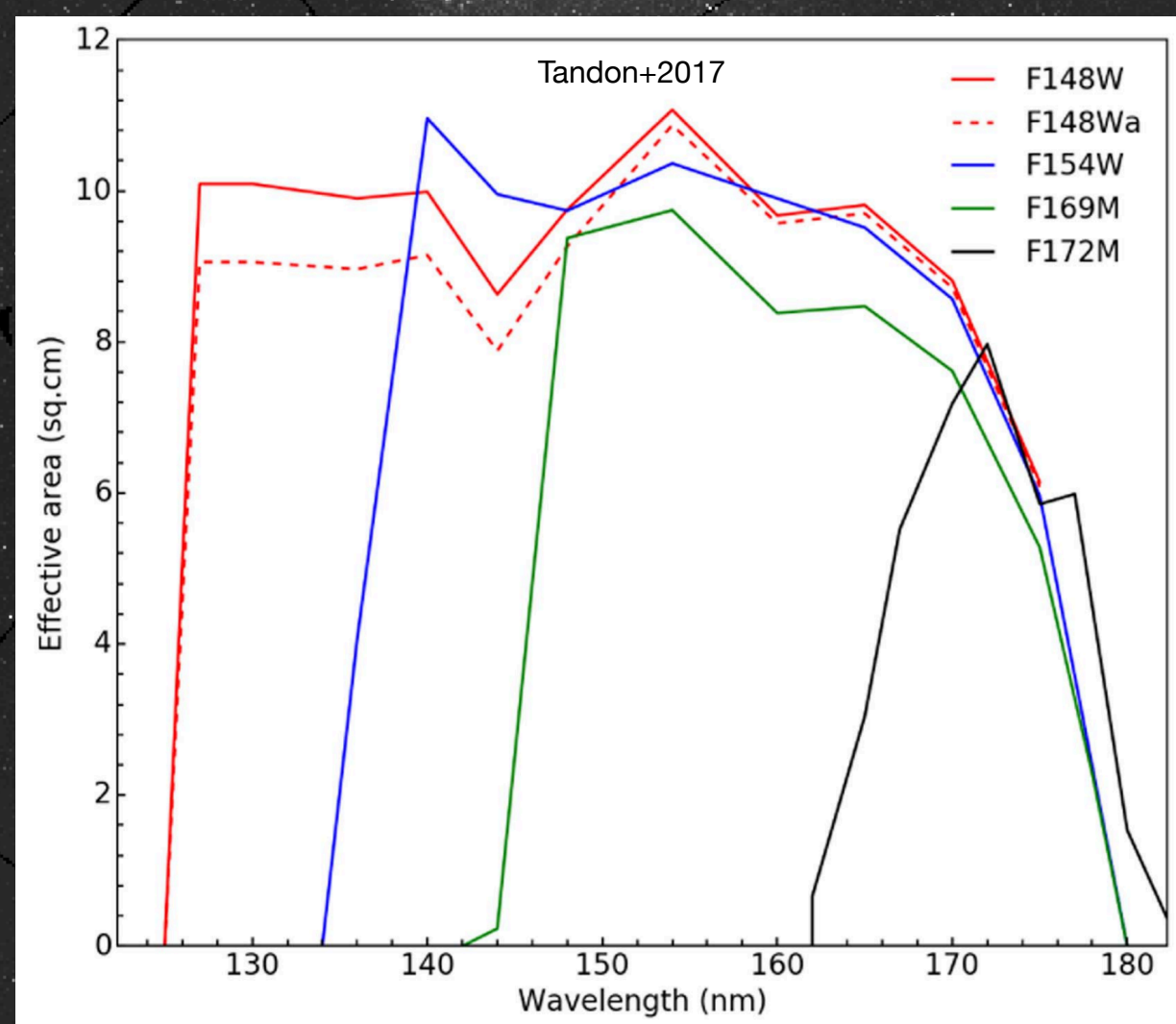
Ongoing Astrosat/UVIT A09 program for SMC

47 UVIT pointings (~40% already complete)
Covering main body of SMC and the Wing
1 ks integration / pointing

UVIT F172M (FUV.Silica) bandpass (see plot on left)
Narrowest FUV filter, used to ensure detector safety
Point source limit, $3\sigma = 20.1$ ABmag

Approved Astrosat/UVIT A10 program for LMC

83 UVIT pointings (...to be observed soon)
Same observing strategy as our SMC survey
Coverage coordinated to match existing Swift/UVOT NUV imaging

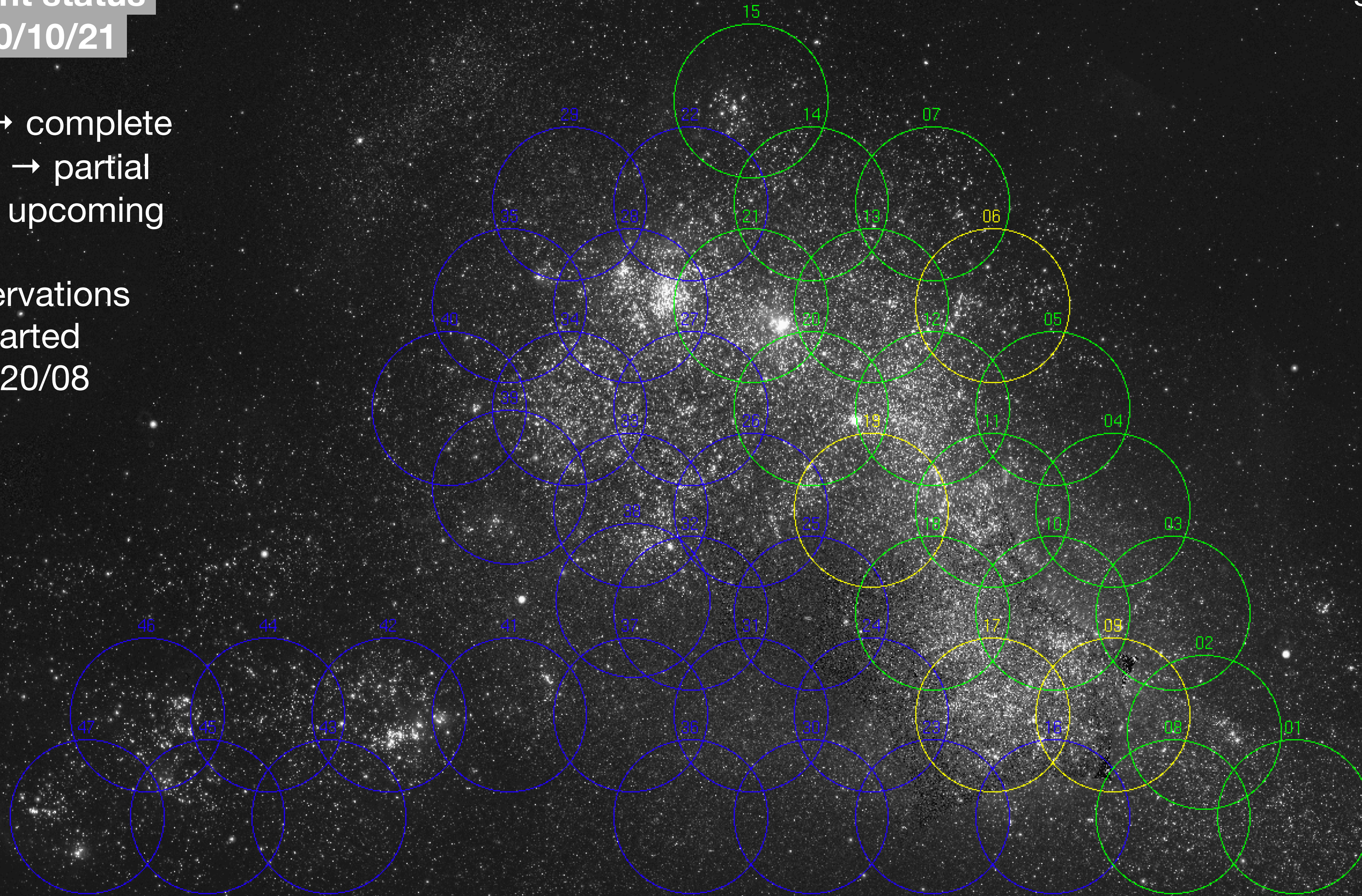


Current status
2020/10/21

Small Magellanic Cloud (SMC)

Green → complete
Yellow → partial
Blue → upcoming

Observations
started
2020/08

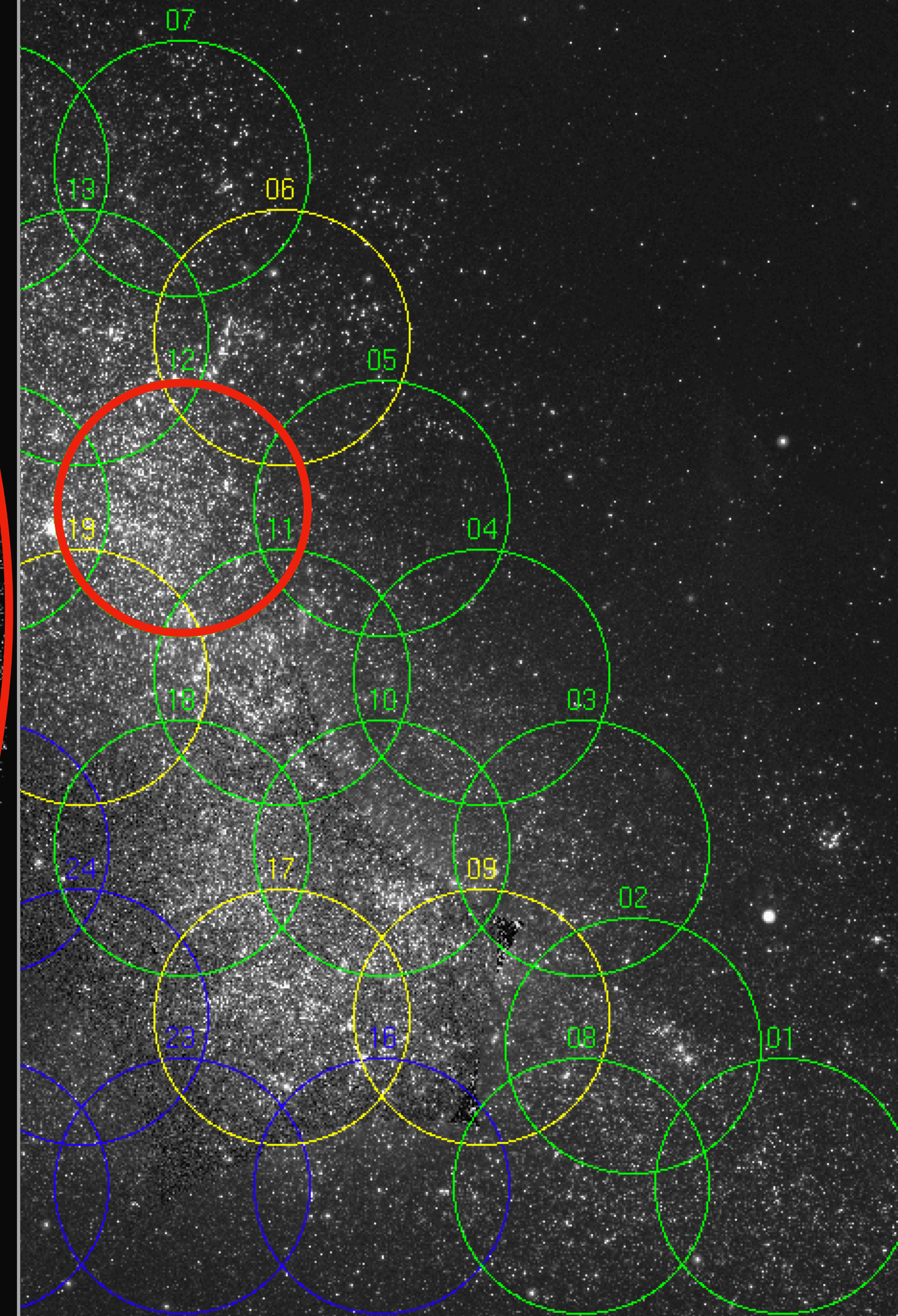
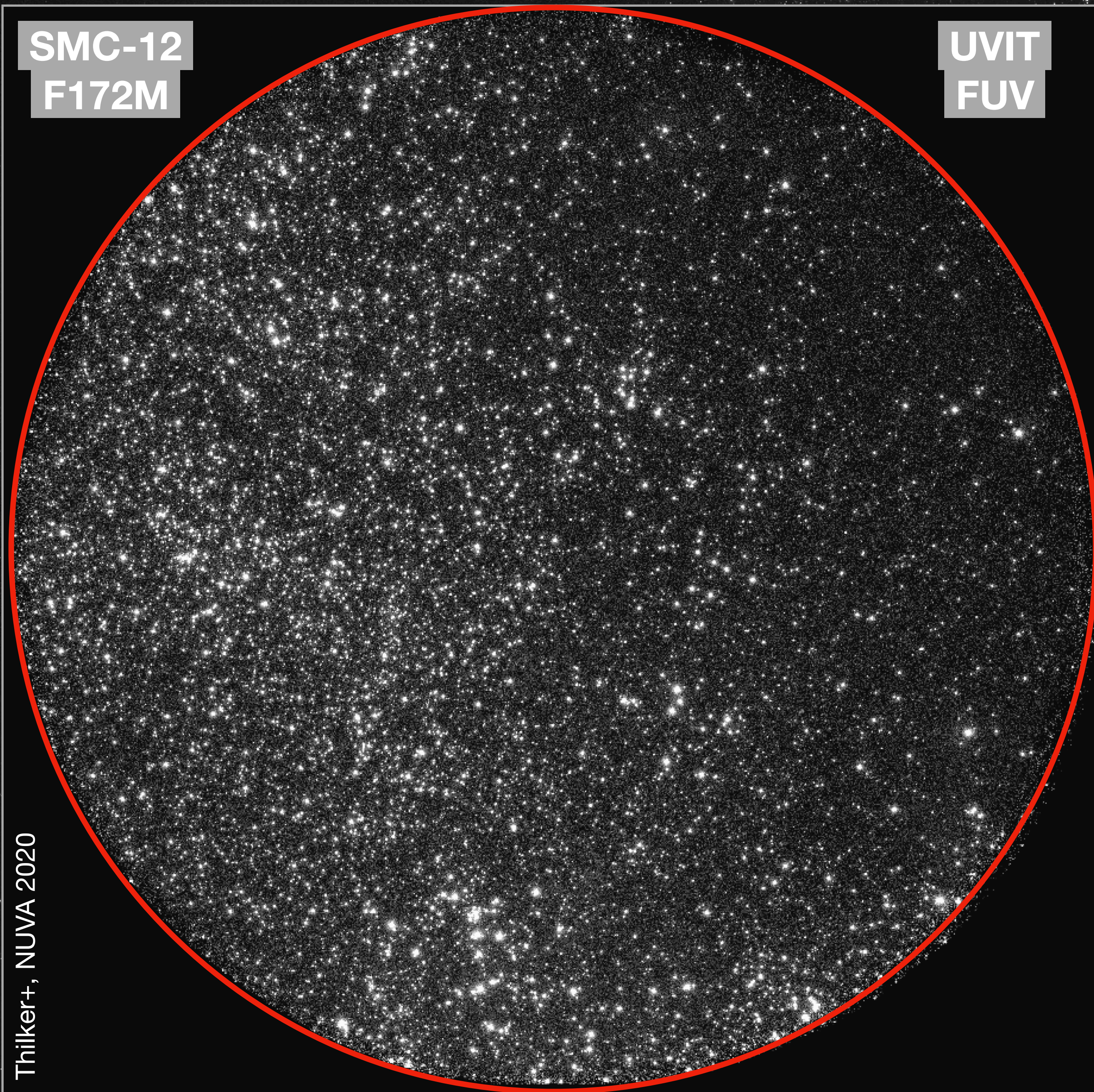


Background (GALEX NUV, Thilker+ 2021 with UVIT FUV Survey marked)

SMC-12
F172M

UVIT
FUV

Thilker+, NUVA 2020



Background (GALEX NUV, Thilker+ 2021 with UVIT FUV Survey marked)

SMC-12
F172M

333" x 333" subsection
~ 97 pc @ SMC

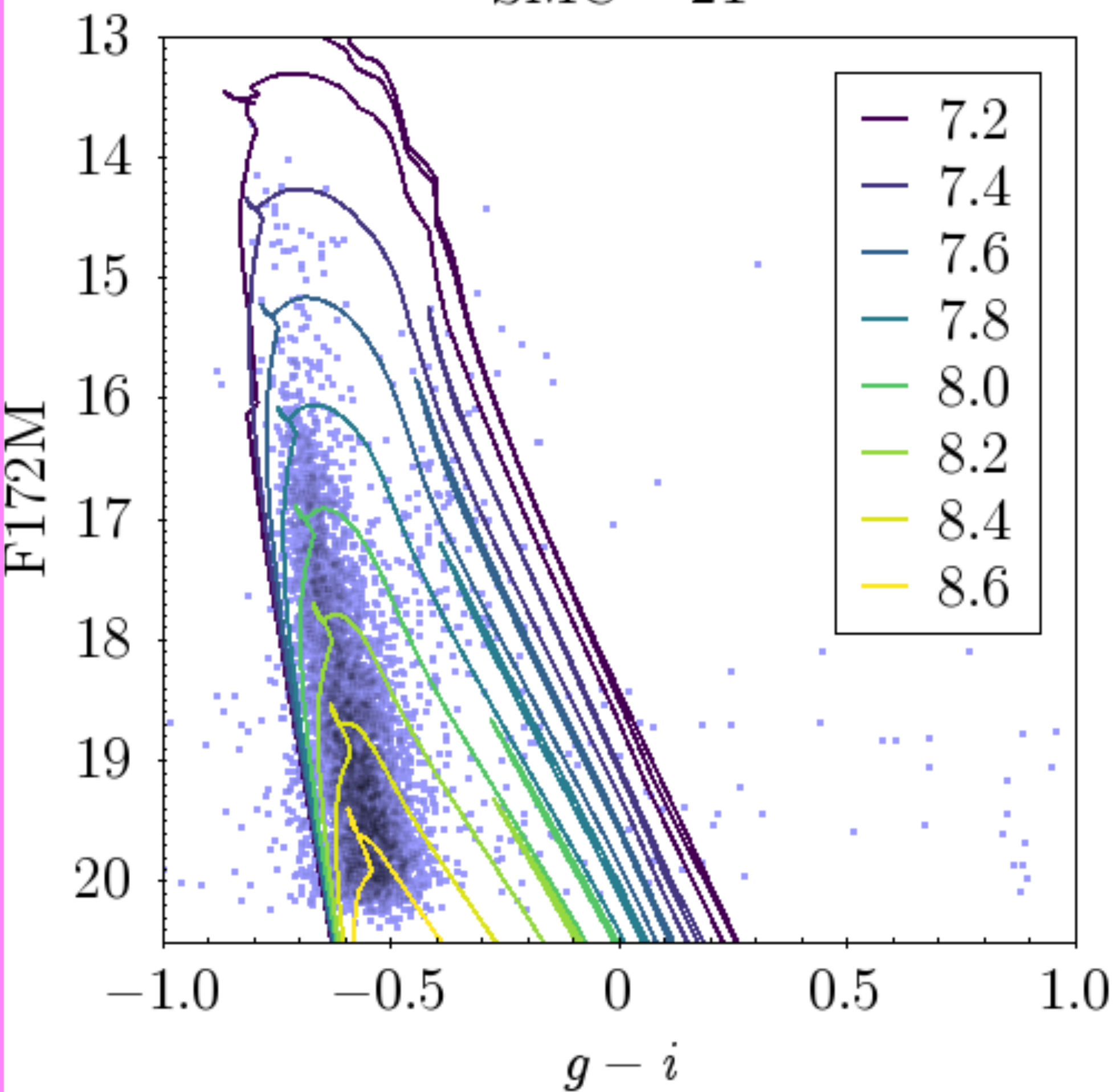
Example stellar cluster
Bruck 79
Age ~ 50 Myr

UVIT F172M
~1" resolution

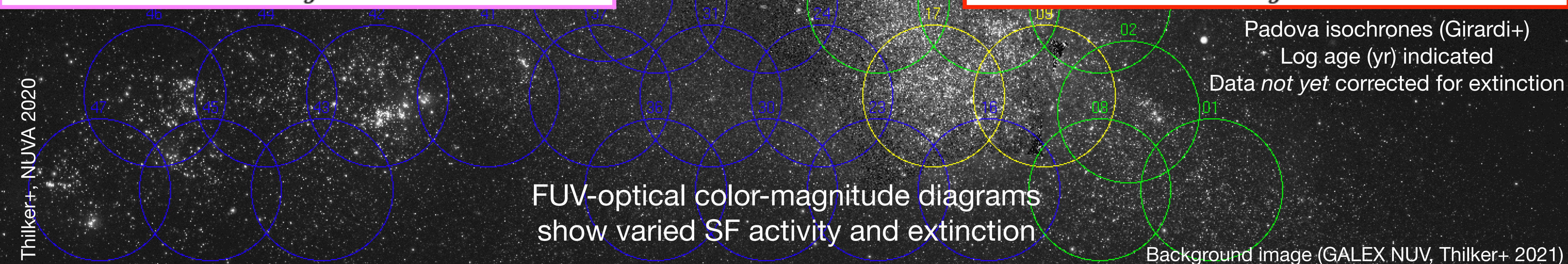
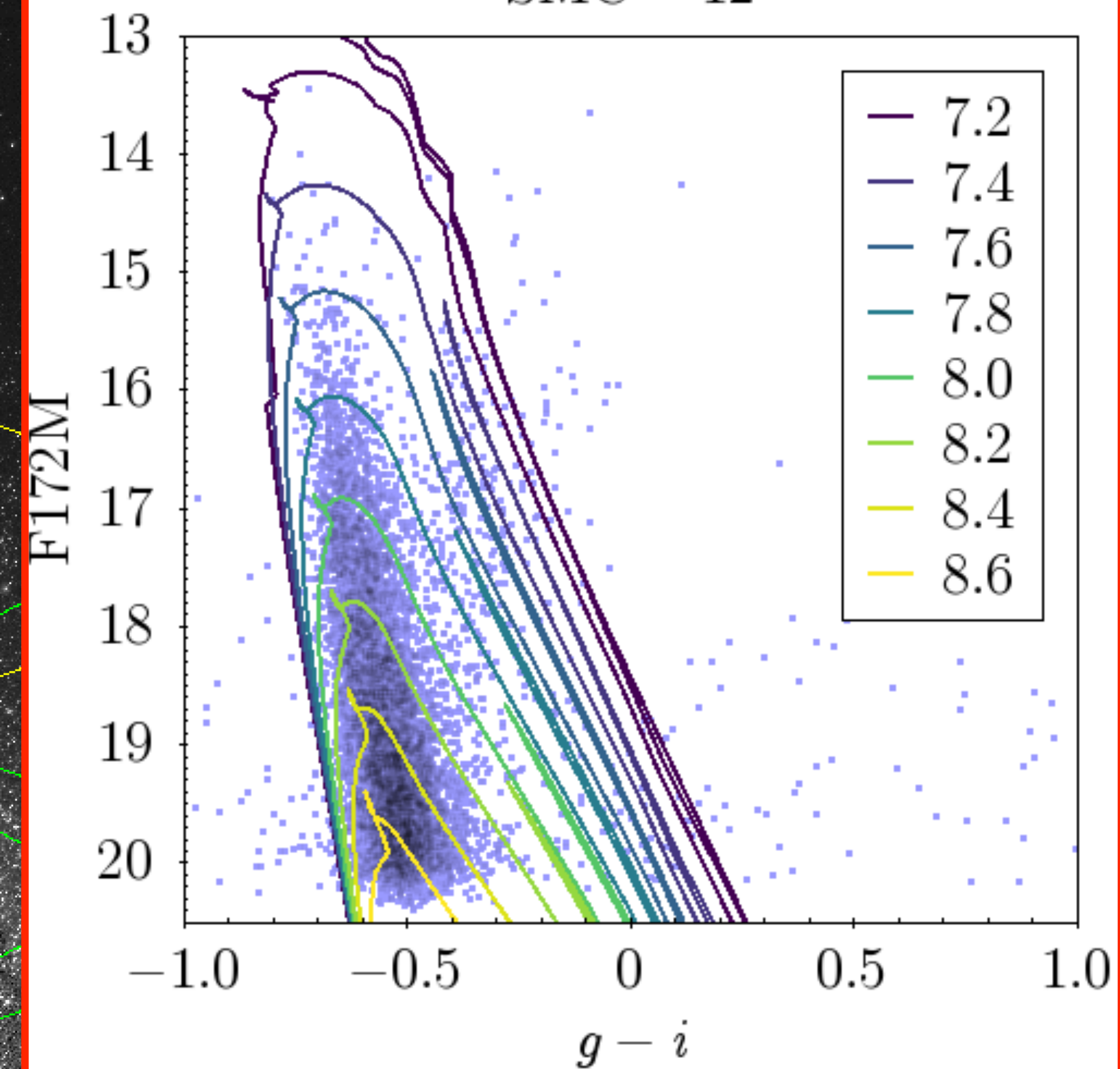
GALEX NUV
5" resolution

UVIT F172M and SMASH photometry (Nidever+17)
will be used to de-blend Swift 3-band NUV imaging
via forced PSF-fitting photometry

SMC - 21



SMC - 12



Future work

Conduct stellar and cluster SED fitting (UVIT FUV+UVOT NUV+optical)
Study environmental variations of the extinction law
Validate safety of all survey pointings for future imaging in broad UVIT bands

Further observational goals

Repeat *safe regions* w/ FUV.CaF2 (@1480A) → measurement of FUV color improves constraint of LyC production rate, with implications for feedback.
Few deep pointings in FUV.CaF2 (e.g. 10ks → 2.8 mag fainter than now)
Expand areal coverage, especially for LMC and MB

Related work

Bianchi+ poster (this meeting), concerning UVIT imaging of Local Group galaxies — including 4 pointings in the outer SMC and 3 fields in the Magellanic Bridge (MB), each with multi-filter UVIT coverage