The Stellar Content of the Magellanic System

Unlocking the Secrets of Star Formation

Jason Harris (Steward Observatory)
Much of what we struggle to understand in distant galaxies can be studied in great detail, here in our backyard.
Magellanic Clouds Photometric Survey
Magellanic Clouds Photometric Survey

LMC
UBVI photometry of 20 million stars
8°x8°

SMC
UBVI photometry of 6 million stars
4.6°x4°

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UBVI Photometry

20 million LMC stars

6 million SMC stars
Construct a synthetic CMD library from isochrones
Construct a synthetic CMD library from isochrones

http://marvin.as.arizona.edu/~jharris/SFH

StarFISH: Interpreting the Fossil Record

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Construct a synthetic CMD library from isochrones

Combine synthCMDs linearly to make a composite model

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http://marvin.as.arizona.edu/~jharris/SFH
Construct a synthetic CMD library from isochrones

Combine synthCMDs linearly to make a composite model

Adjust synthCMD amplitudes until composite model matches target data set
The Star Formation History of the SMC
The Star Formation History of the SMC

Divide SMC into 420 subregions

Determine SFH for each region independently
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Determine SFH for each region independently
The Star Formation History of the SMC

Map of the Global SFH of the SMC

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The Star Formation History of the SMC

Total SFR\( (t) \)
The Star Formation History of the LMC
The Star Formation History of the LMC
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Conformal gridding of the CMDs

Emphasize the MS LF, supergiants, and red clump

Insulate against extinction, metallicity errors
The Star Formation History of the LMC
The Star Formation History of the LMC

Total SFR($t$)
The Star Formation History of the LMC

Comparing LMC & SMC SFHs
The Star Formation History of the LMC

Comparing to HST studies

![Graph of SFR vs Age for LMC](chart)

- Smecker-Hane et al. (2002)
- Holtzman et al. (1999)
- Olsen (1999)

Holtzman et al. (1999)
The Star Formation History of the LMC

Comparing to HST studies

Smecker-Hane et al. (2002)
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Comparing to HST studies

LMC

Olsen (1999)
The Star Formation History of the LMC

160 Myr timestep
The Star Formation History of the LMC

160 Myr timestep

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The Star Formation History of the LMC

8-10 Myr timestep

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The Star Formation History of the LMC

8-10 Myr timestep

[Graphs and data plots related to star formation history are shown.]
A Detailed Look at LMC 4
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LMC 4 doesn’t distinguish itself from the background until ~25 Myr ago.
The Magellanic Bridge
The Magellanic Bridge

Location of 12 CTIO Mosaic fields
The Magellanic Bridge
fields containing old stars
fields containing young stars

CR Photometry of 12 CTIO Mosaic fields

Middle fields consistent with contaminant population

SMC LMC
The Magellanic Bridge

There are no old stars associated with the Magellanic Bridge

Therefore, no stars were tidally stripped when the Bridge was formed

Really??!
The Magellanic Bridge
Yes, really.
The Magellanic Bridge
Yes, really.
The Magellanic Bridge

Yes, really.

The Bridge material was >97% gas by mass when the Bridge formed.
The Magellanic Bridge
Outer structure of the LMC
The Magellanic Bridge
Outer structure of the LMC
The Magellanic Bridge
Outer structure of the LMC
The Magellanic Bridge
Young stellar population
The Magellanic Bridge
Young stellar population
The Magellanic Bridge
Young stellar population

onset of SF: ~200 Myr ago
The Outer Limits Survey
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