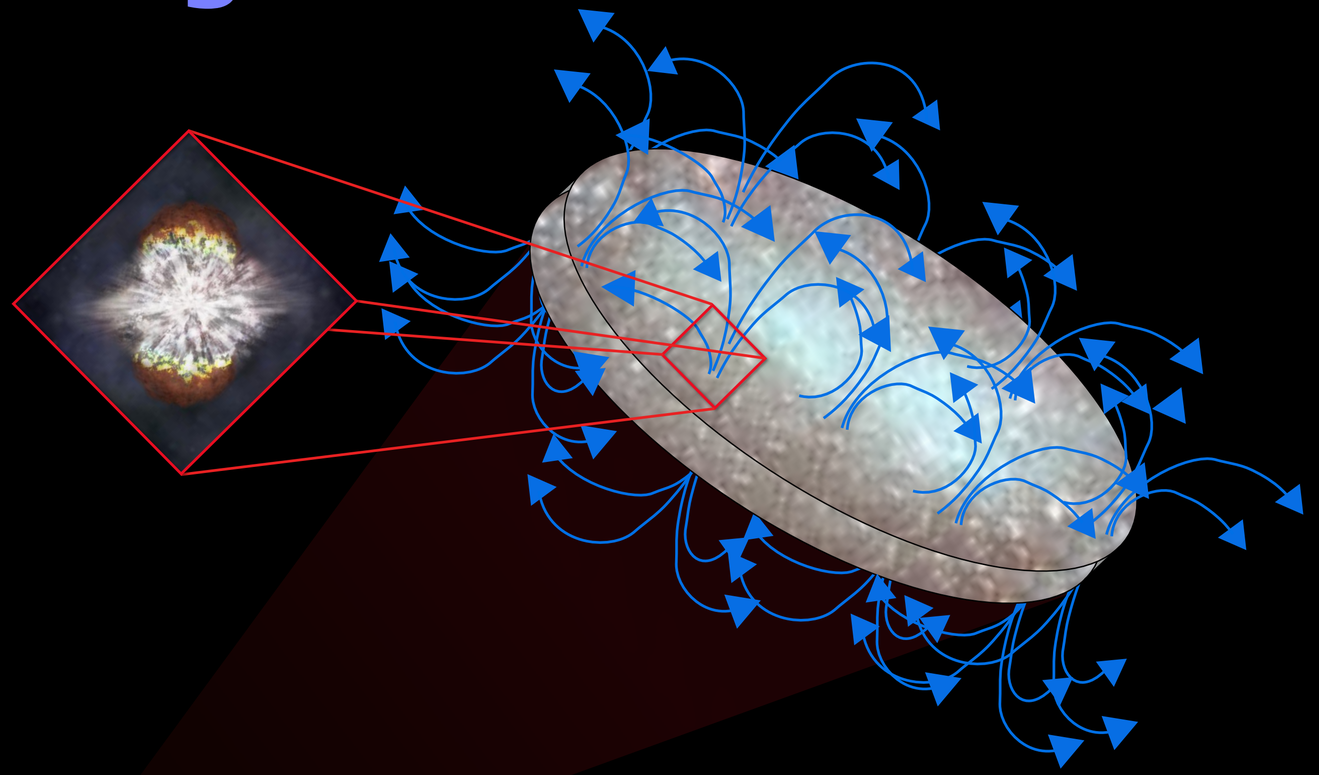
The Supernovae-Driven Winds of the Large Magellanic Cloud Galaxy



AAS Talk: 427.01
Thurs at 10 am

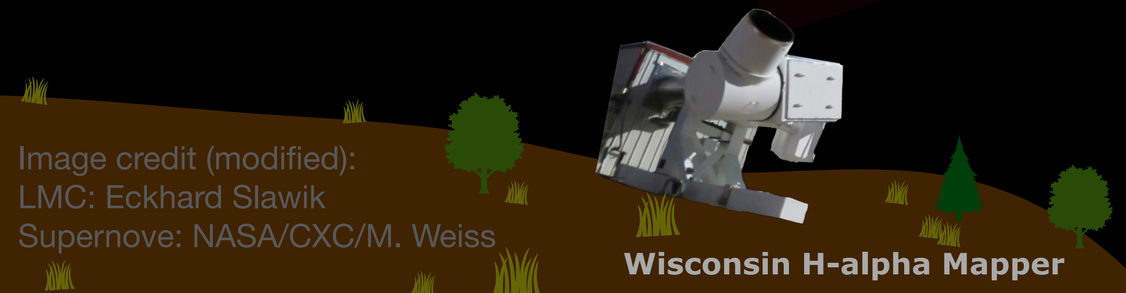


Image credit (modified):
LMC: Eckhard Slawik
Supernove: NASA/CXC/M. Weiss

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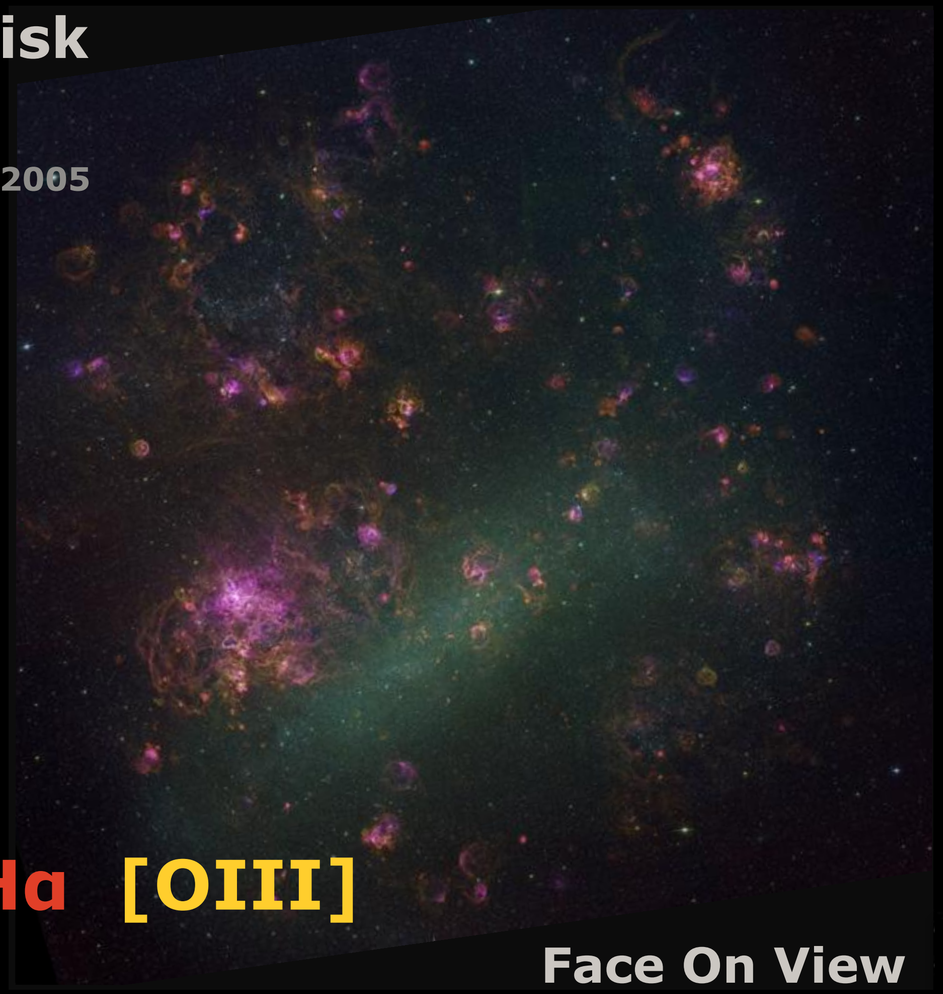
Supernovae are driving a wide spread wind

Diffuse disk emission

MCELS: Smith+2005
Winkler+2015

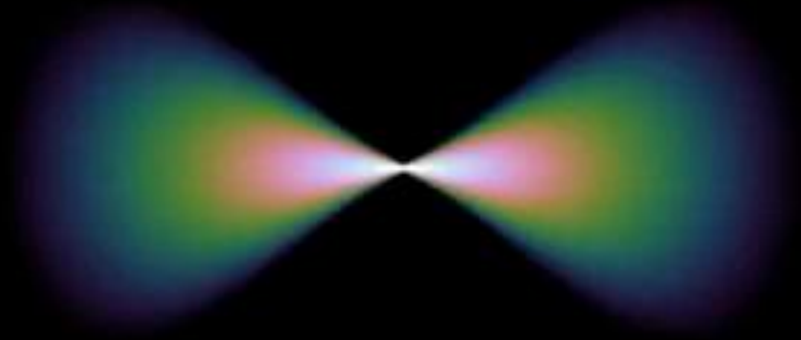


[SII] Hα [OIII]

Face On View

Simulations with Supernovae Explosions

Fielding+2017



Side View

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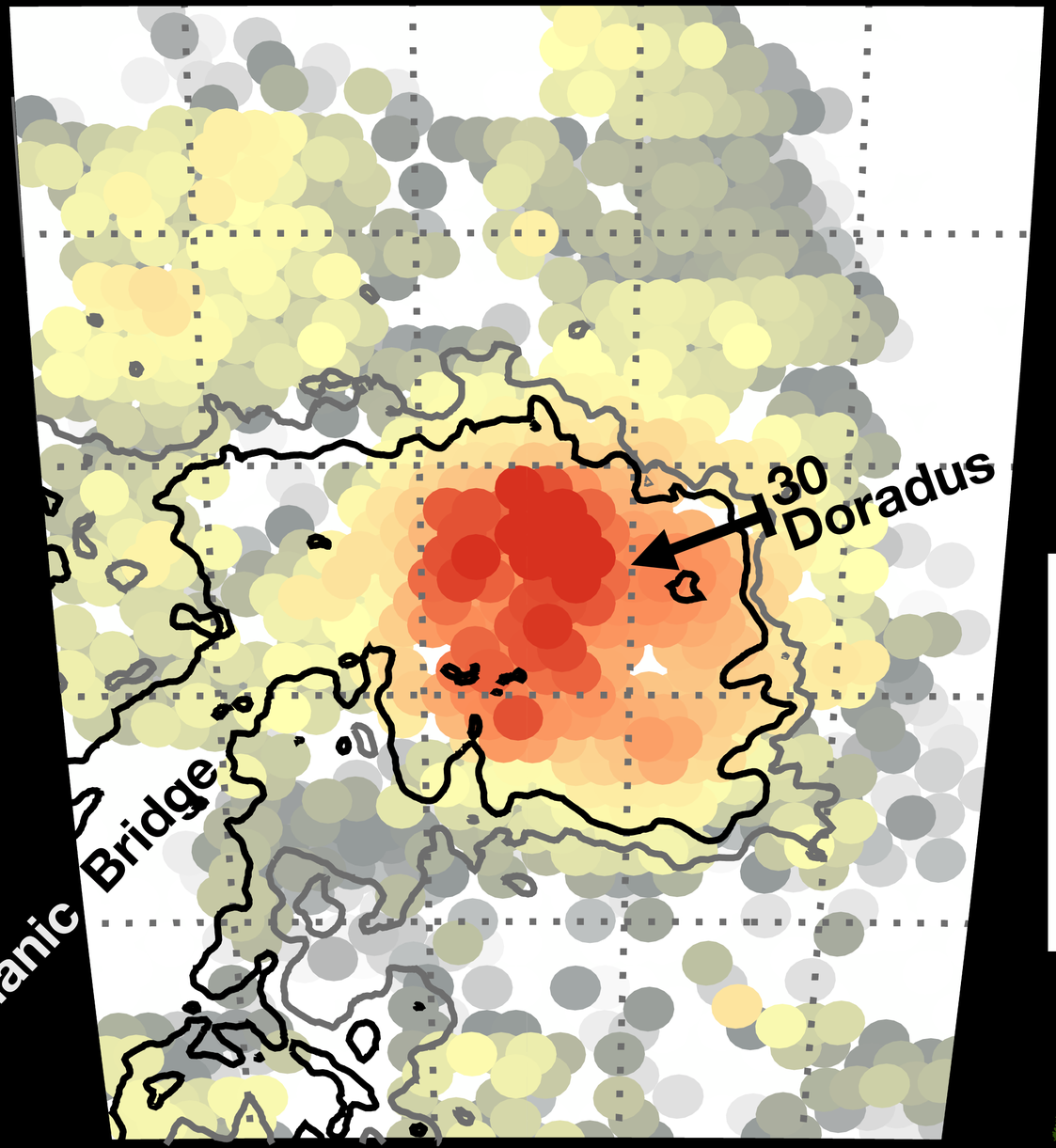
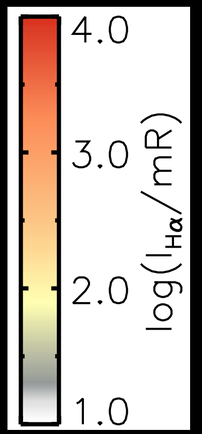
Wind on near side of LMC in Hα emission

Slowest

-75 km/s



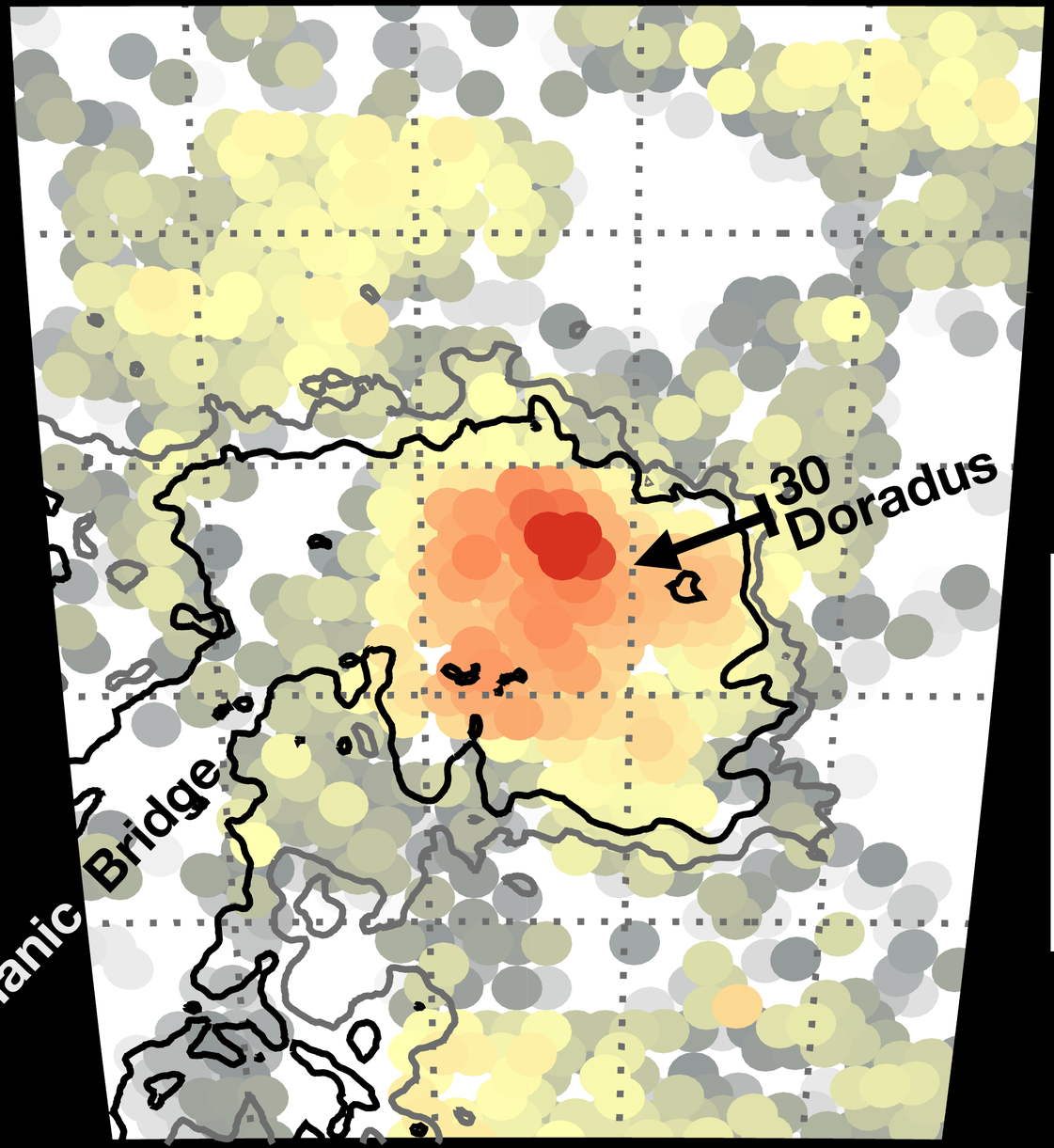


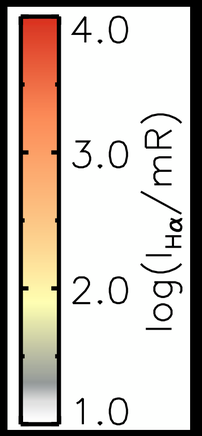
Ciampa + Barger + 2021

Wind on near side of LMC in Hα emission

Slow

-100 km/s



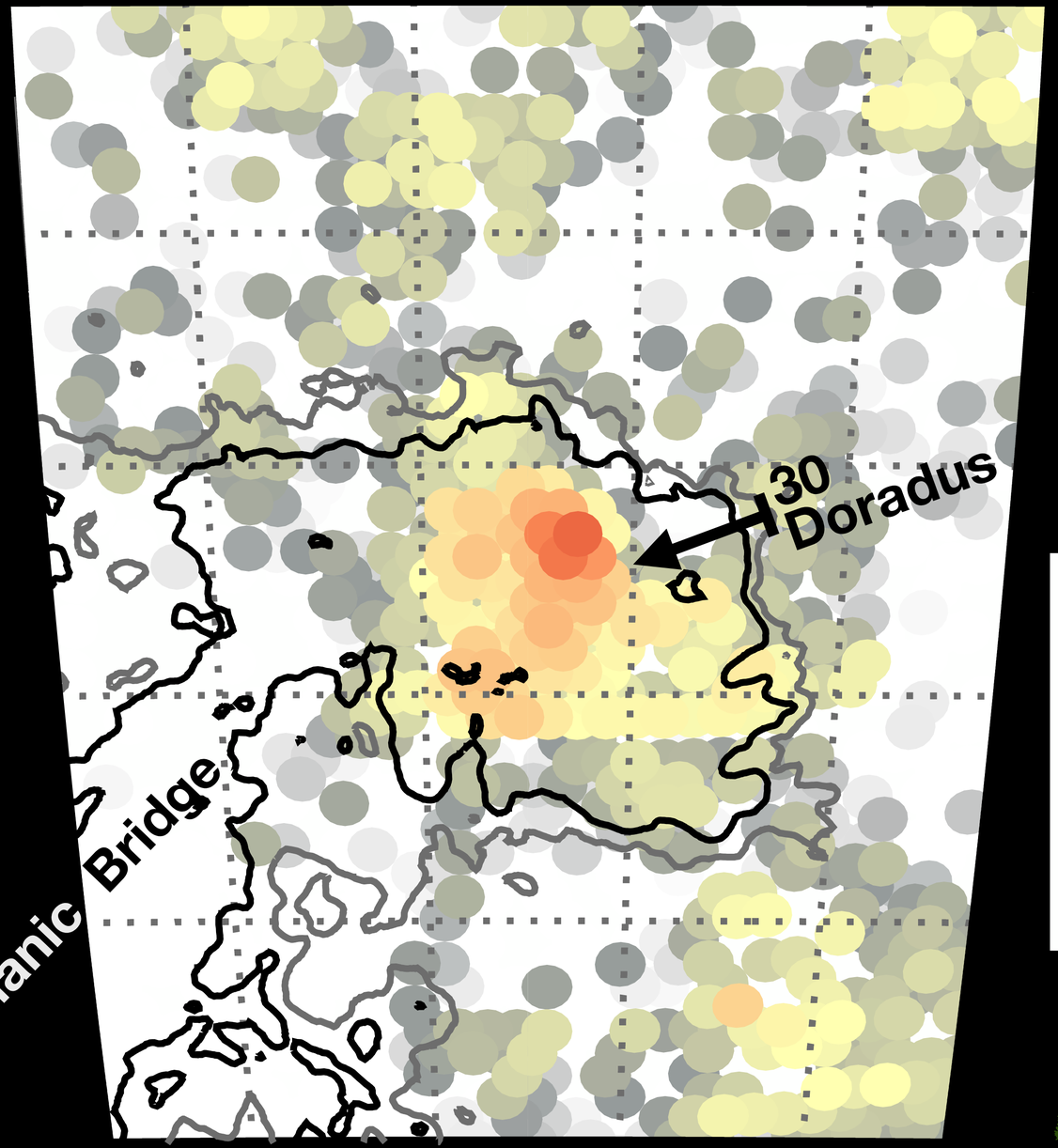


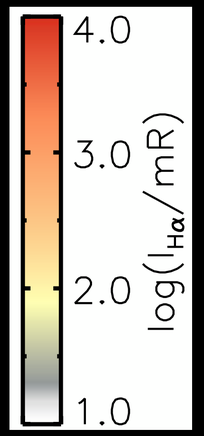
Ciampa + Barger + 2021

Wind on near side of LMC in Hα emission

Faster

-130 km/s





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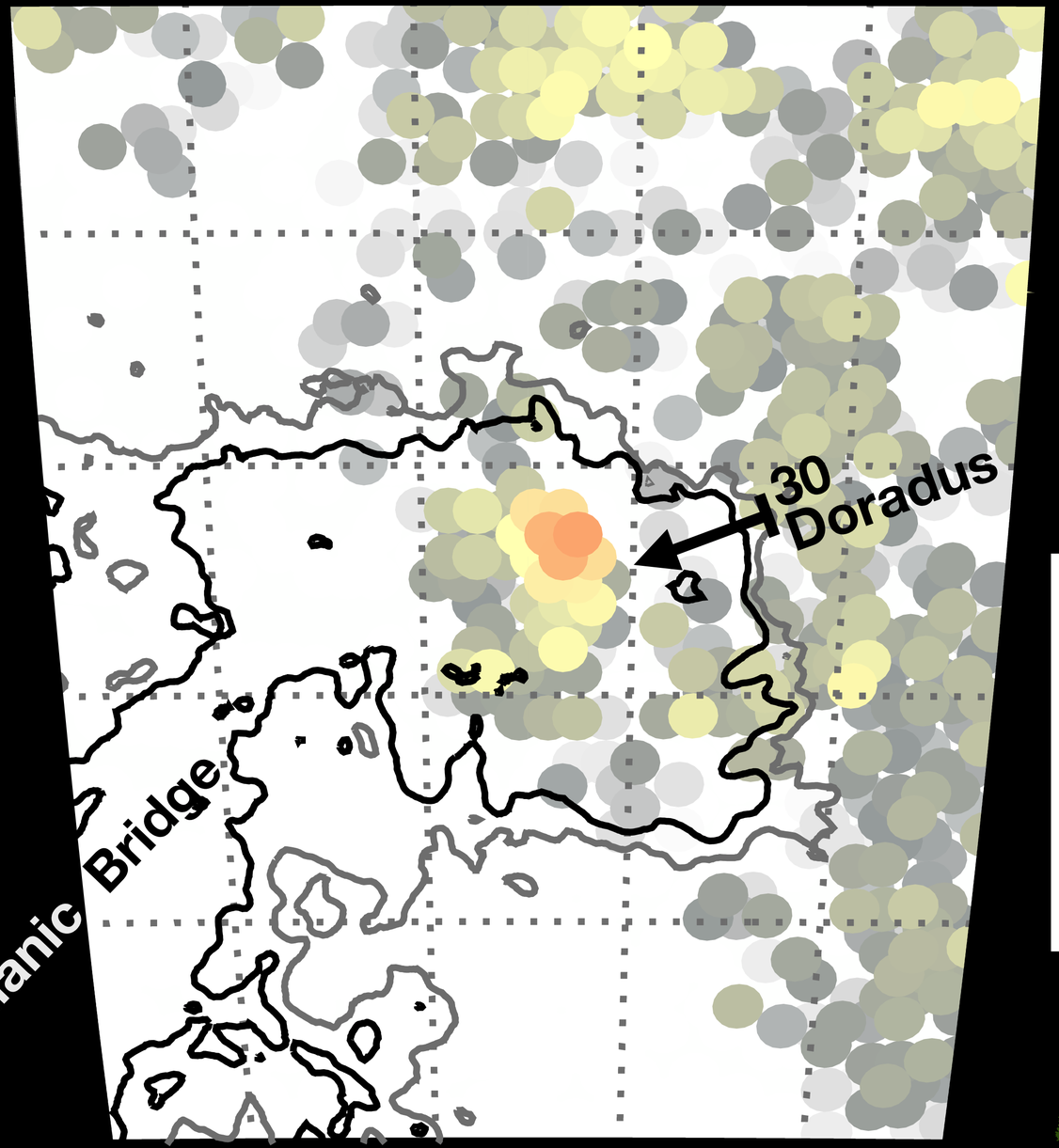
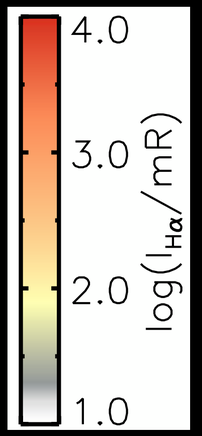
Wind on near side of LMC in Hα emission

Fastest

-160 km/s

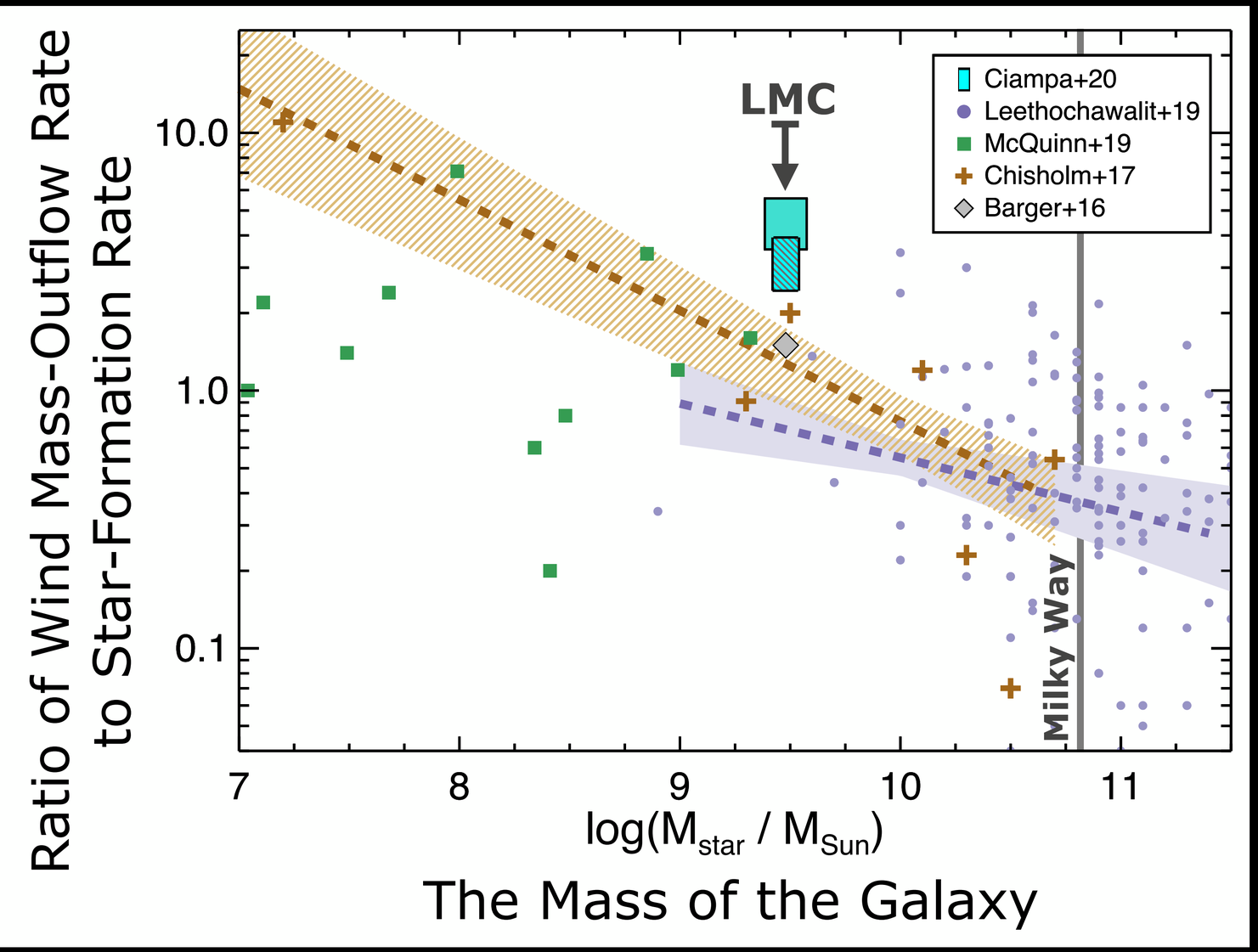


85x10⁶ Msun of gas is being ejected at a rate of 1.4 M_{sun}/yr



Ciampa + Barger + 2021

Mass-Loading Factor



This galaxy is losing 4.5x more gas through the wind than through forming new stars and planets!

This ratio is much larger than for other galaxies of the same mass.

But our observations are 10x more sensitive & the wind is fully mapped.

Barger + 2016, Ciampa + Barger + 2021

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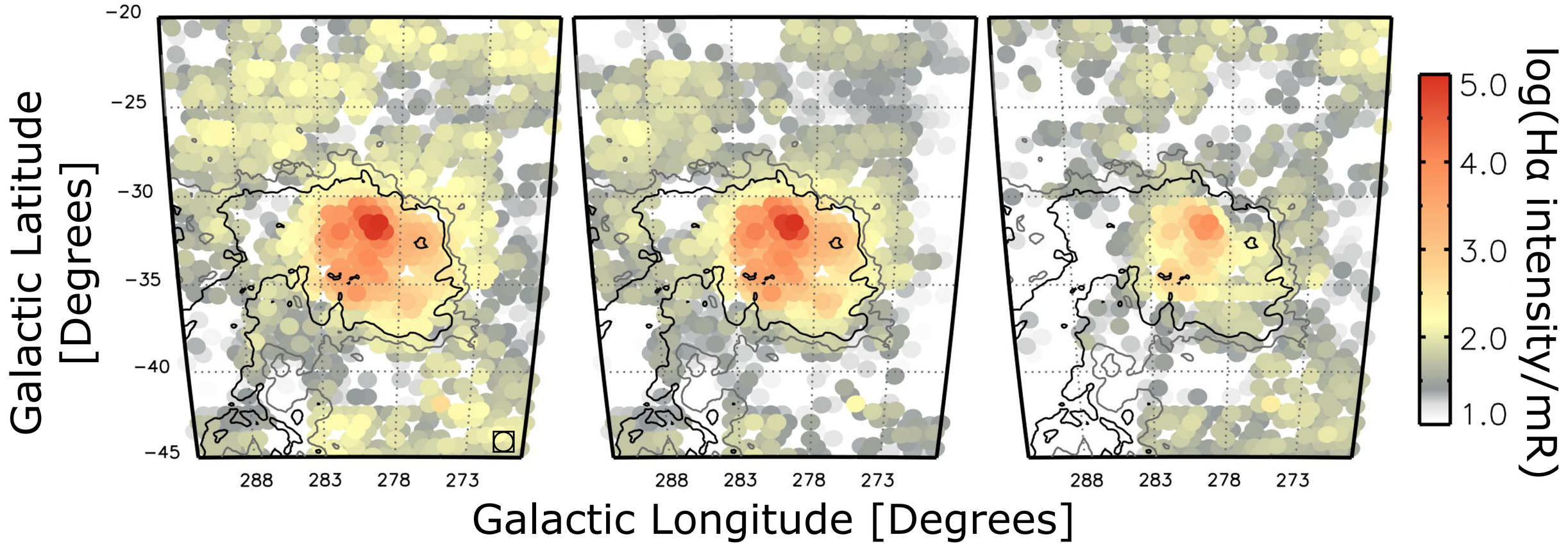
All nearside of wind

Slowest part of wind

Fastest part of wind



Ciampa + Barger + 2021

Will likely fall back to the LMC

Will likely escape and could be captured by the Milky way

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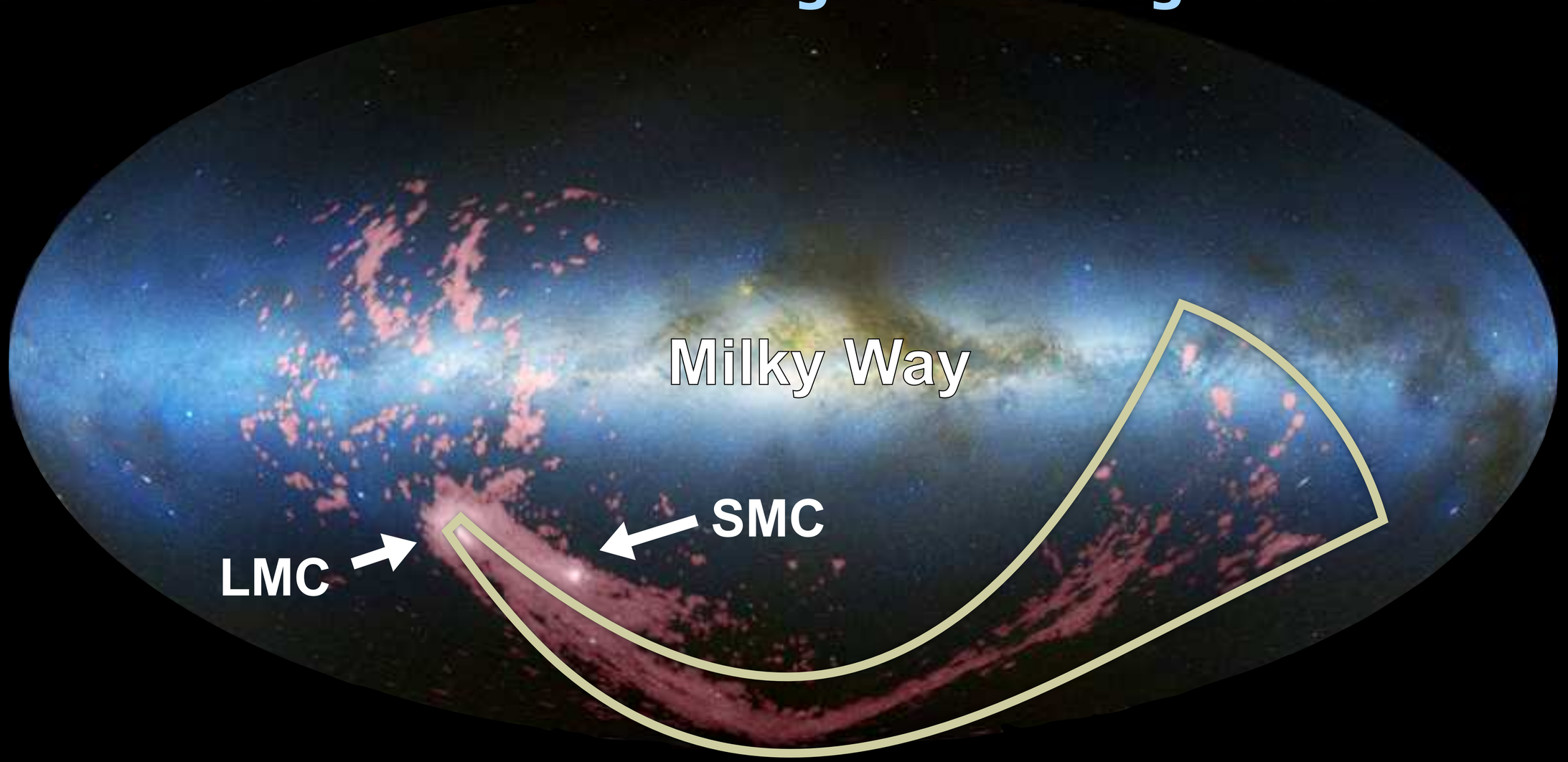
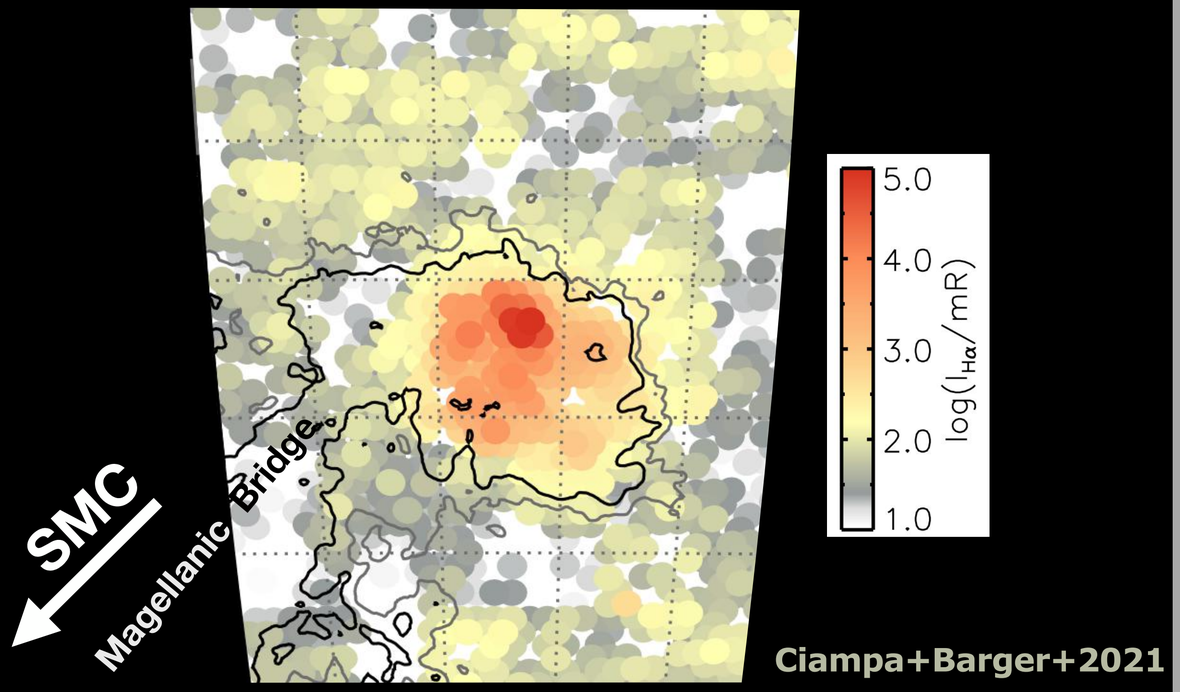
Is the LMC's outflow feeding the trailing tidal stream?

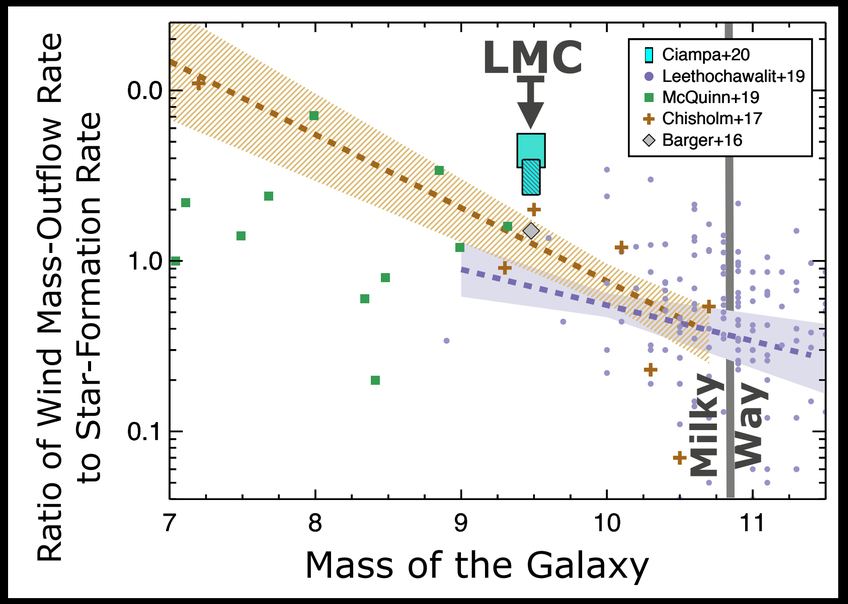


How much of this gas will be captured by our galaxy?
And, how many new stars and planets will it form as a result?

Near side of wind in Hα emission



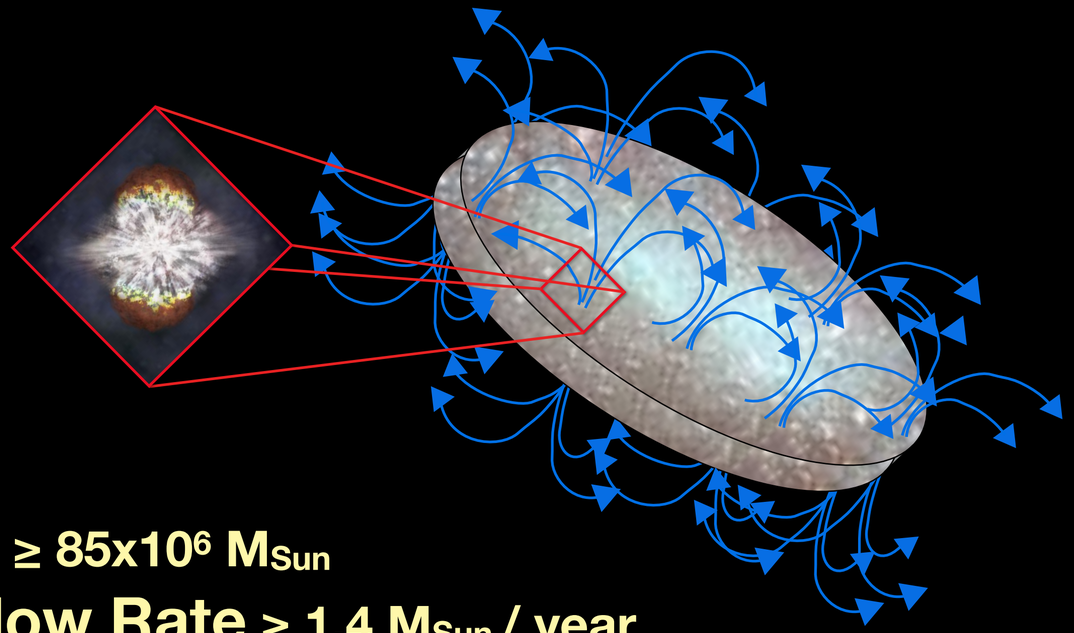
Ciampa+Barger+2021



Loosing 4.5x more gas in wind than gas that it is converting into stars and planets!

Ciampa+Barger+2021

Stellar activity is driving a scale galactic wind out of the Large Magellanic Cloud galaxy



$M_{winds} \geq 85 \times 10^6 M_{Sun}$

Outflow Rate ≥ 1.4 M_{Sun} / year

Barger + 2016
Ciampa + Barger+ 2021

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