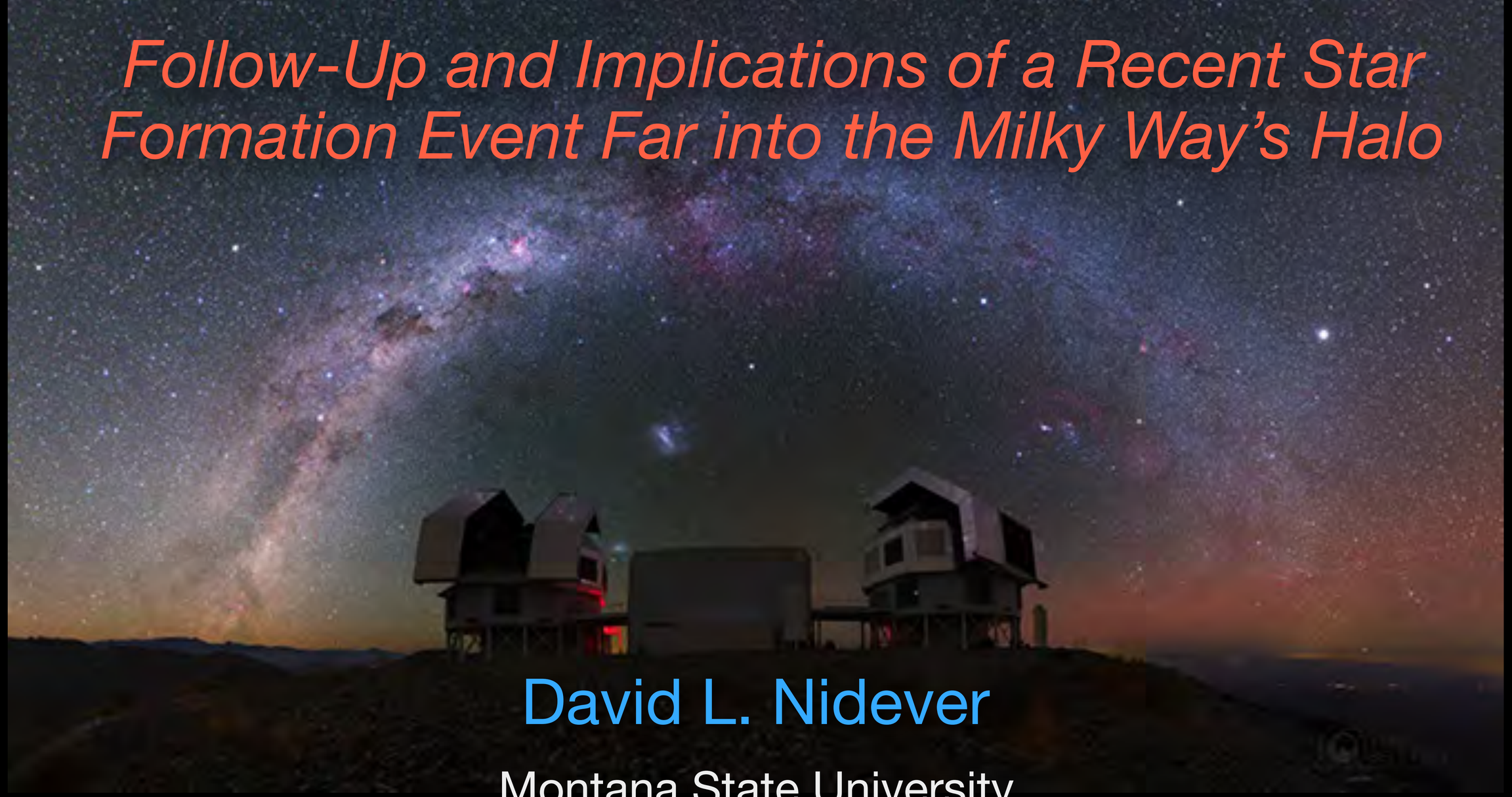
Follow-Up and Implications of a Recent Star Formation Event Far into the Milky Way's Halo



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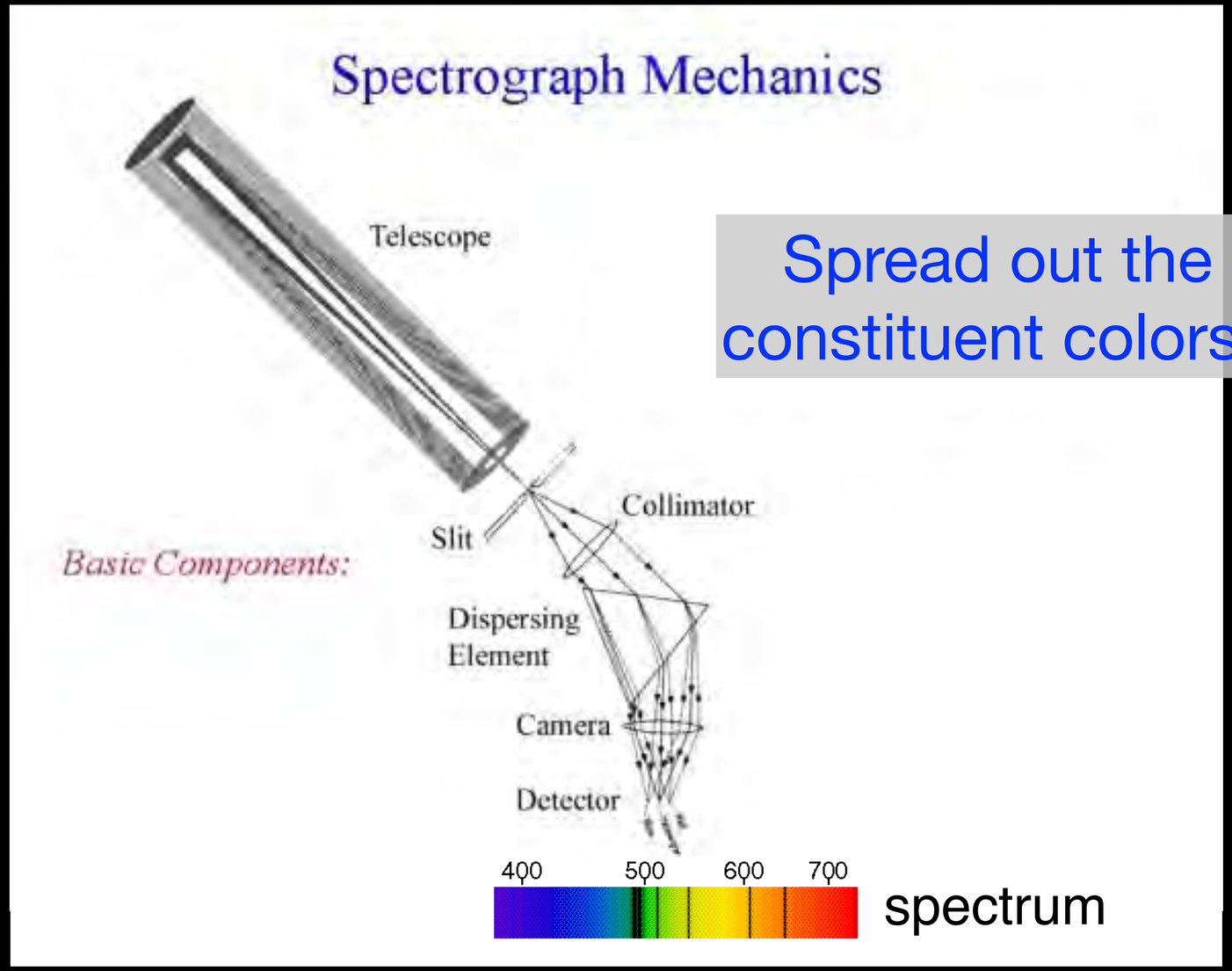
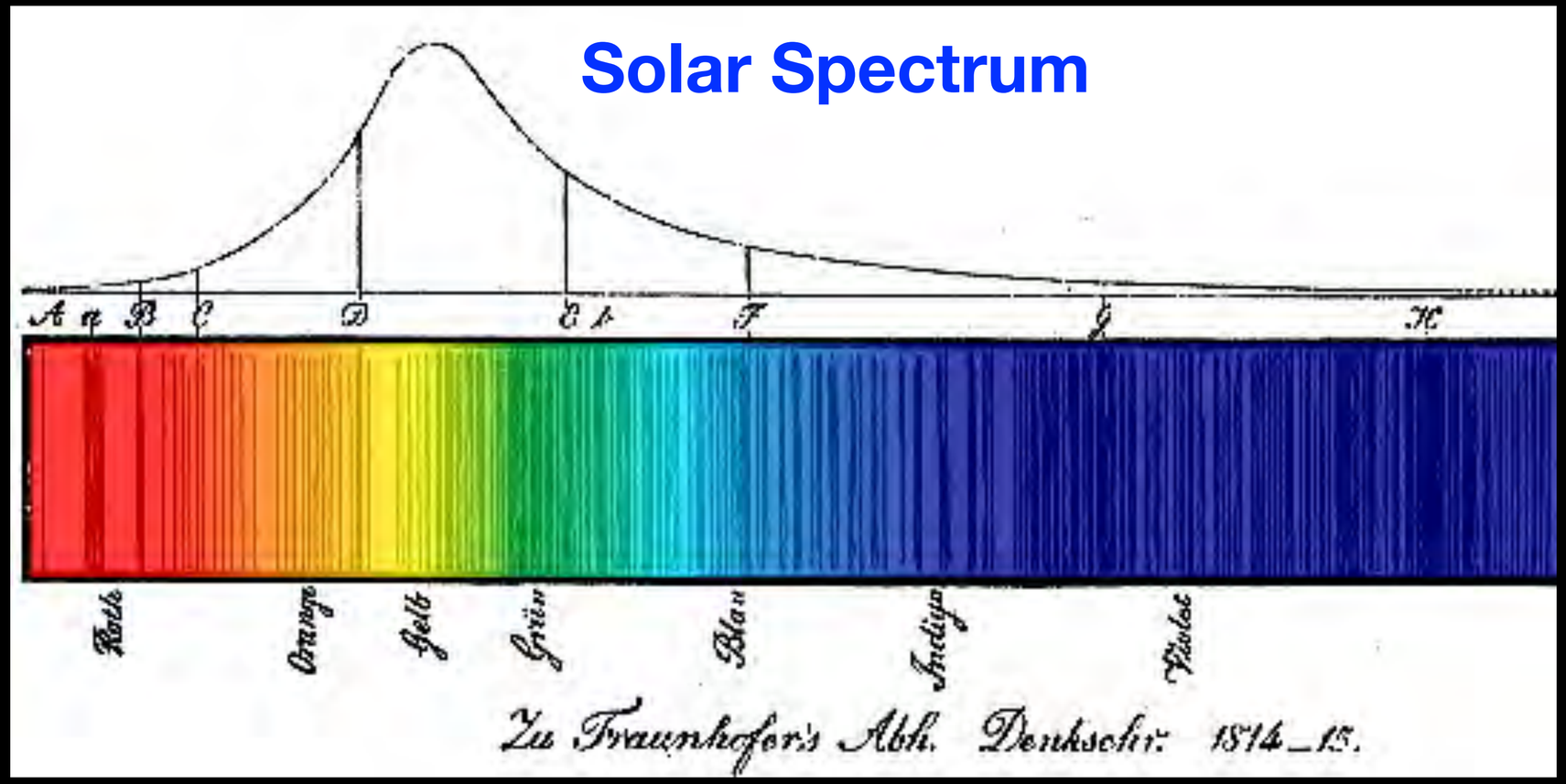
star ★

Spectroscopy

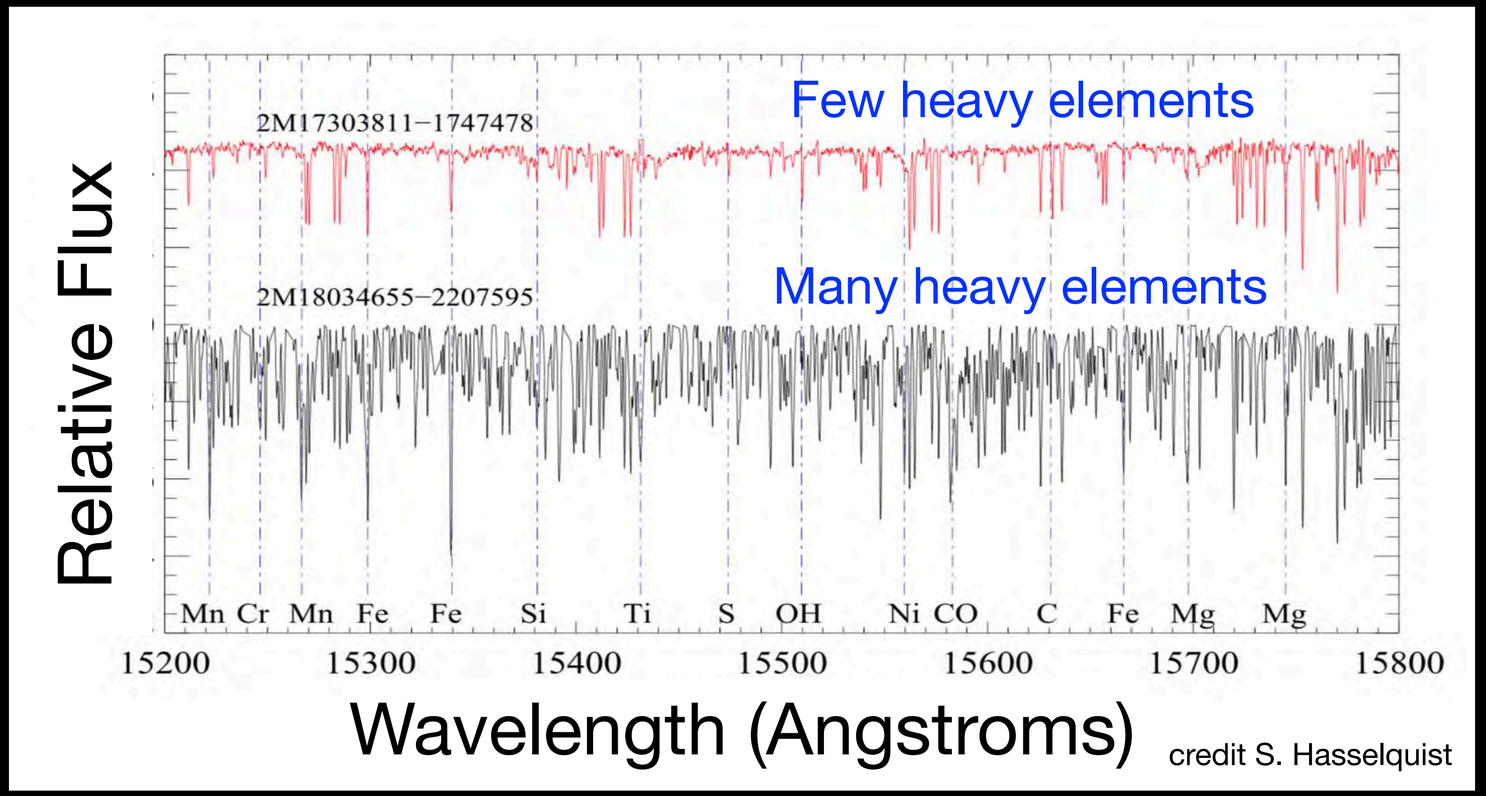


Spread out the starlight into its constituent colors, or a “spectrum”

Spectroscopy



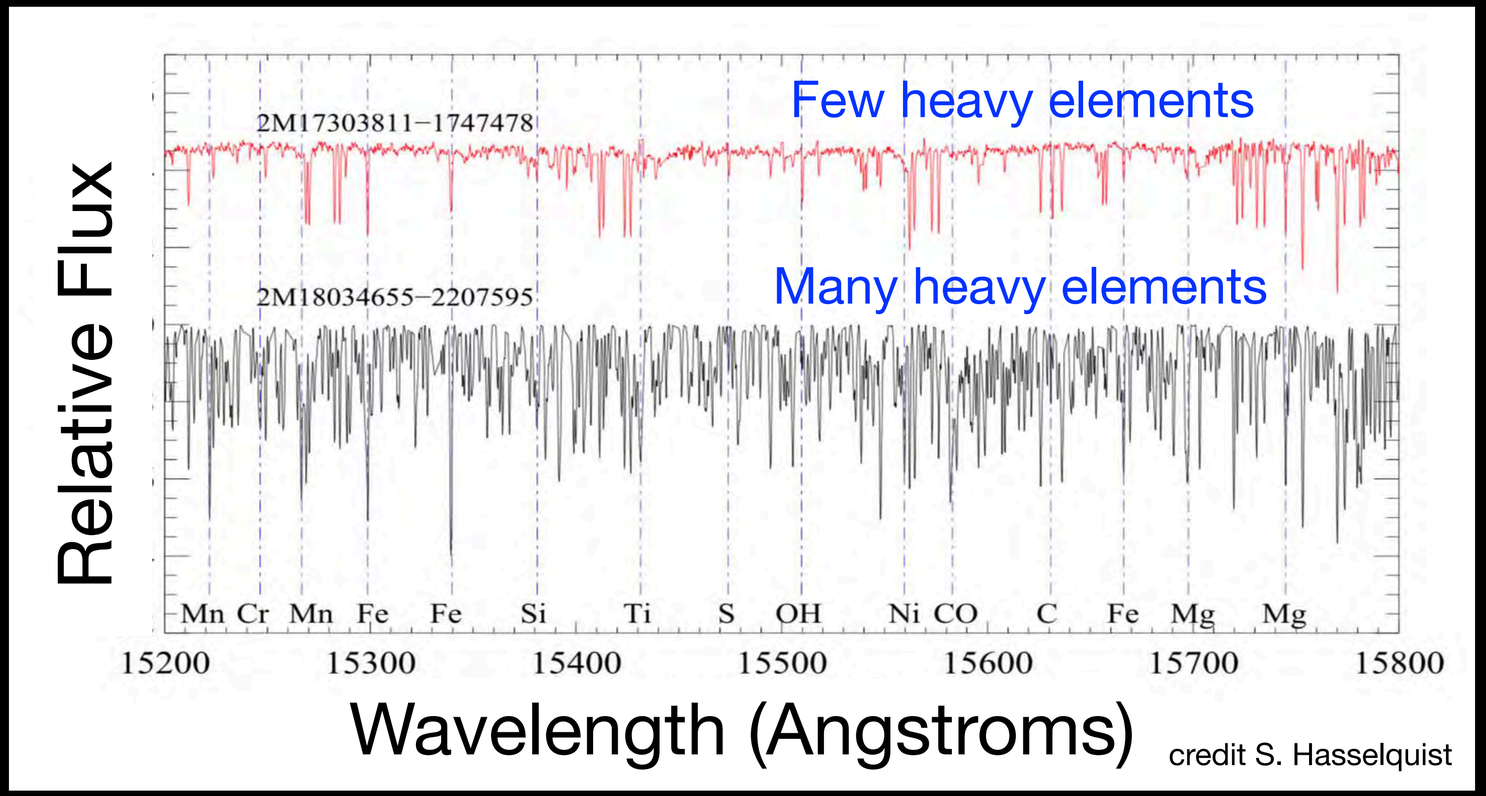
Spectroscopy



credit S. Hasselquist

1.) Measure the amount of heavy elements

Spectroscopy



credit S. Hasselquist

1.) Measure the amount of heavy elements

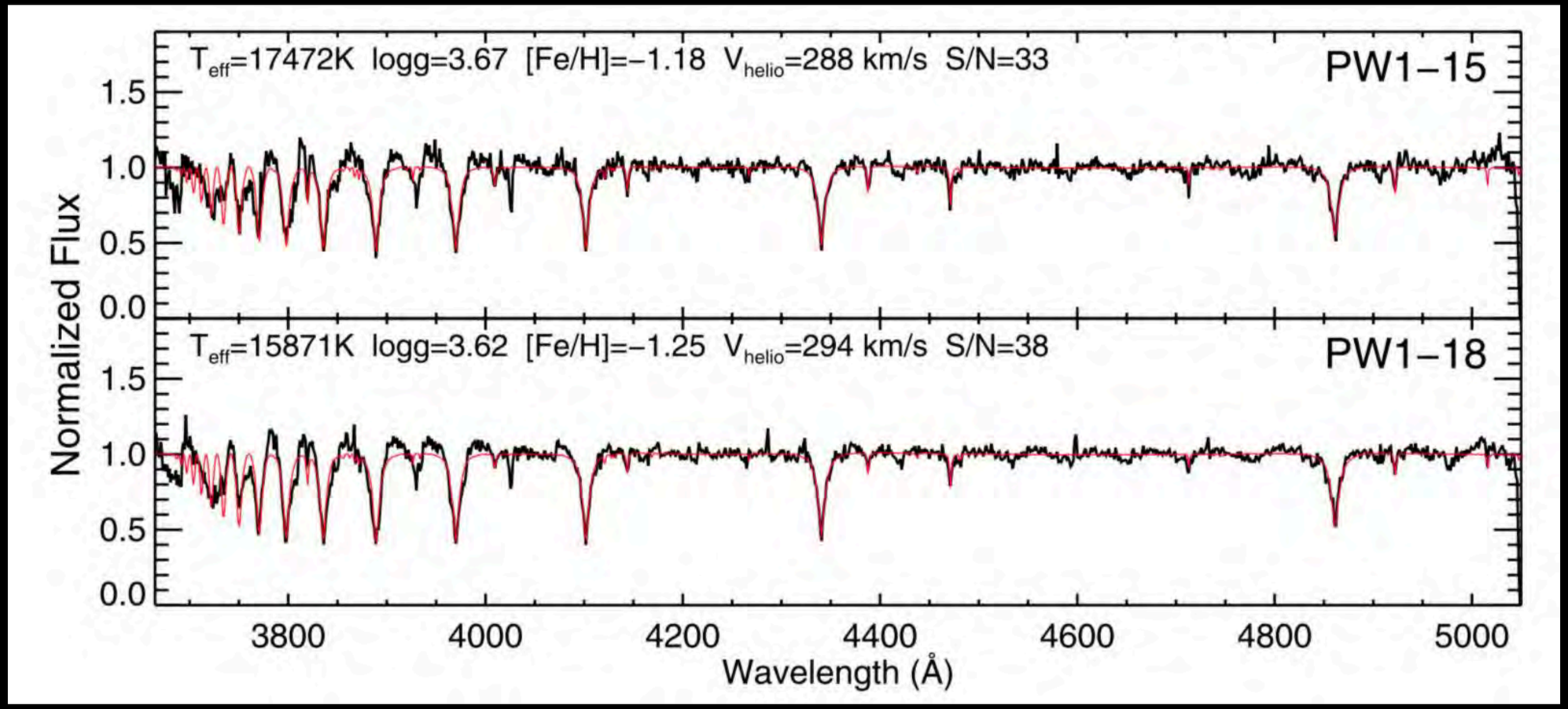
2.) Measure the line-of-sight (radial) velocity

Magellan Telescopes

Magellan 6.5 meter telescopes, Las Campanas Observatory, Chile

- Magellan 6.5 - meter telescope and MIKE spectrograph
- Spectra of 28 brightest PW-1 stars

Example Spectra



Spectroscopic Results

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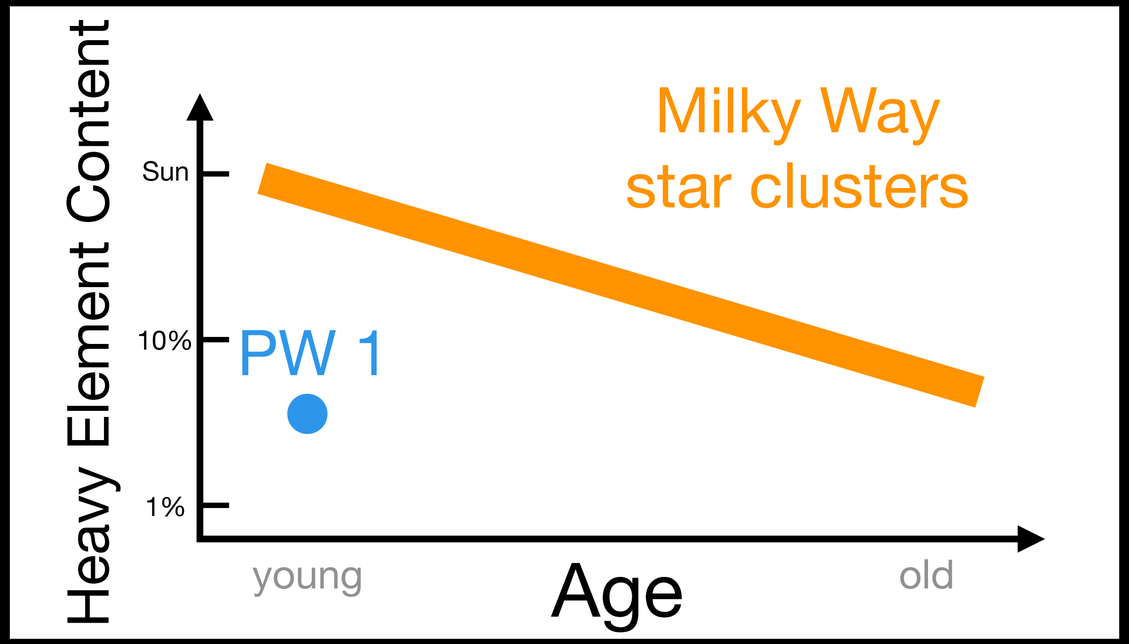

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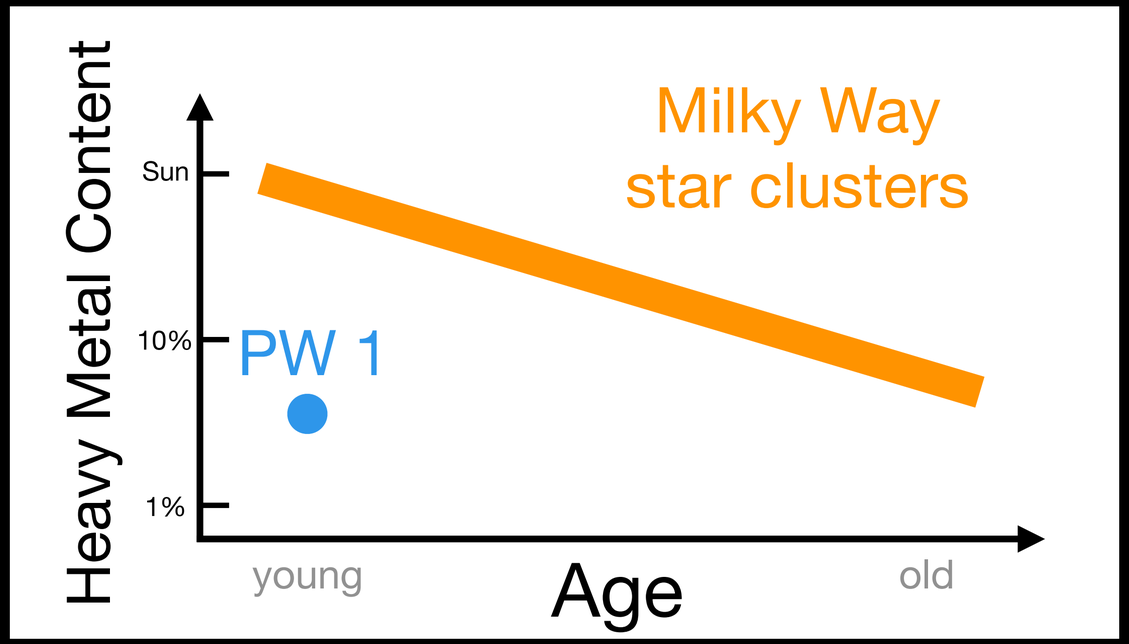
➡ *Matches the Leading Arm/Magellanic Stream*



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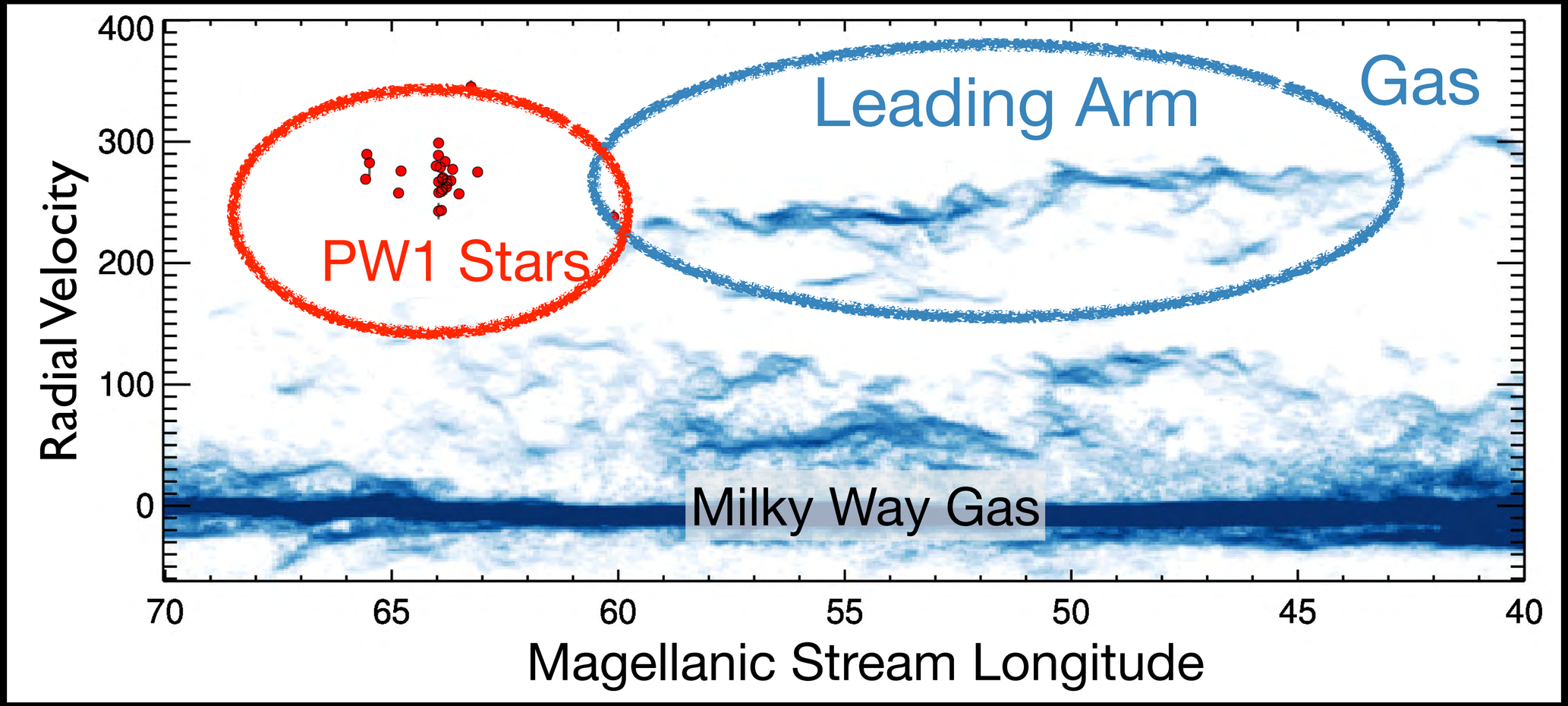
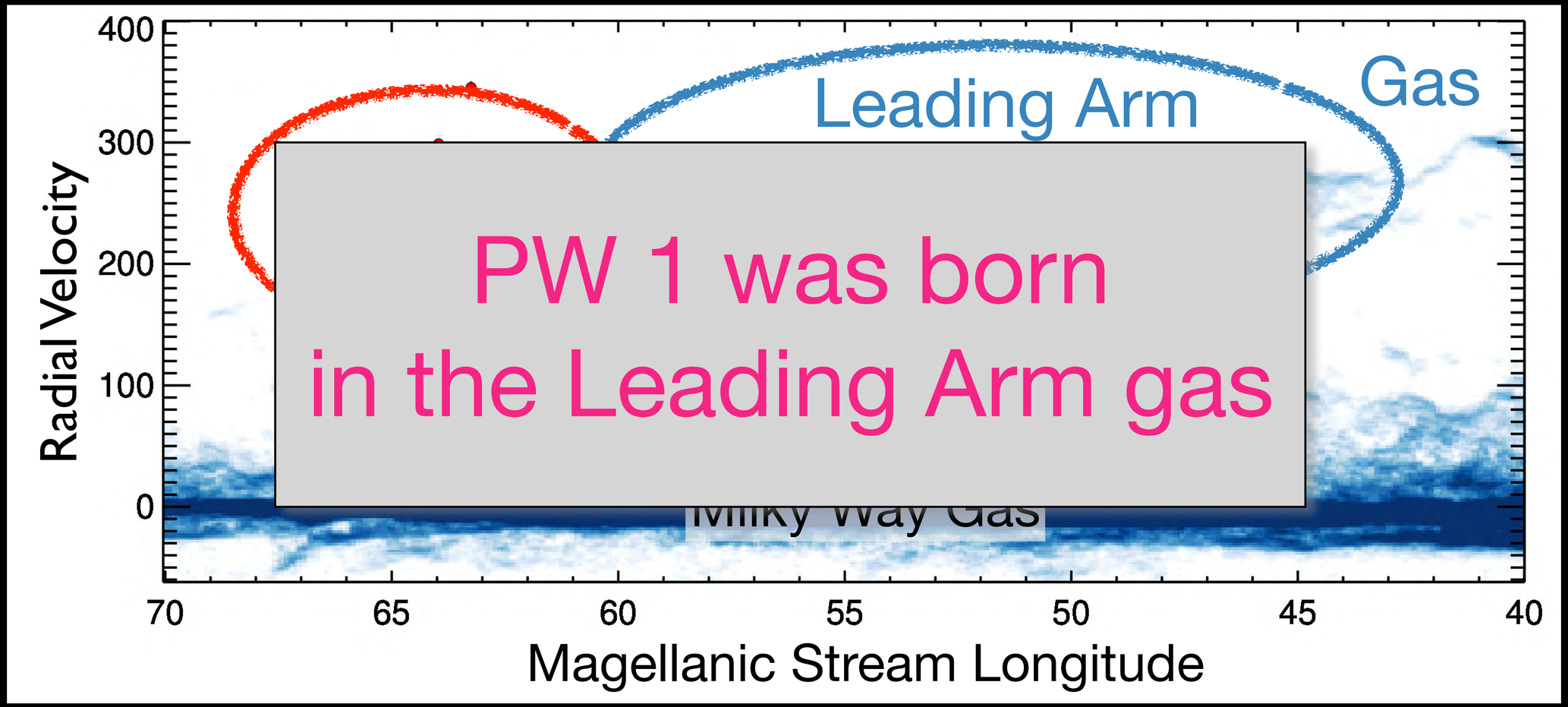
➡ *Consistent with the Leading Arm*

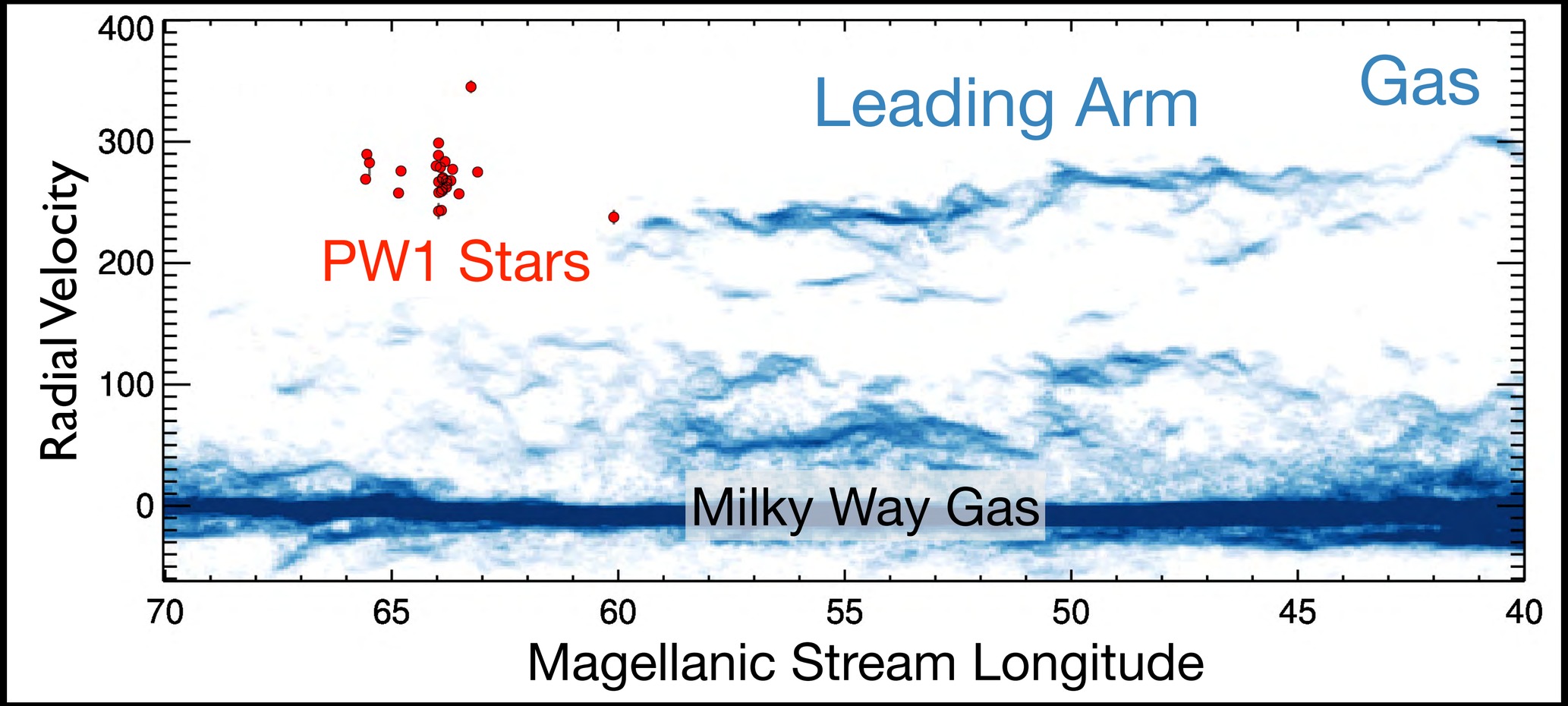
Radial Velocities



Radial Velocities



Radial Velocities

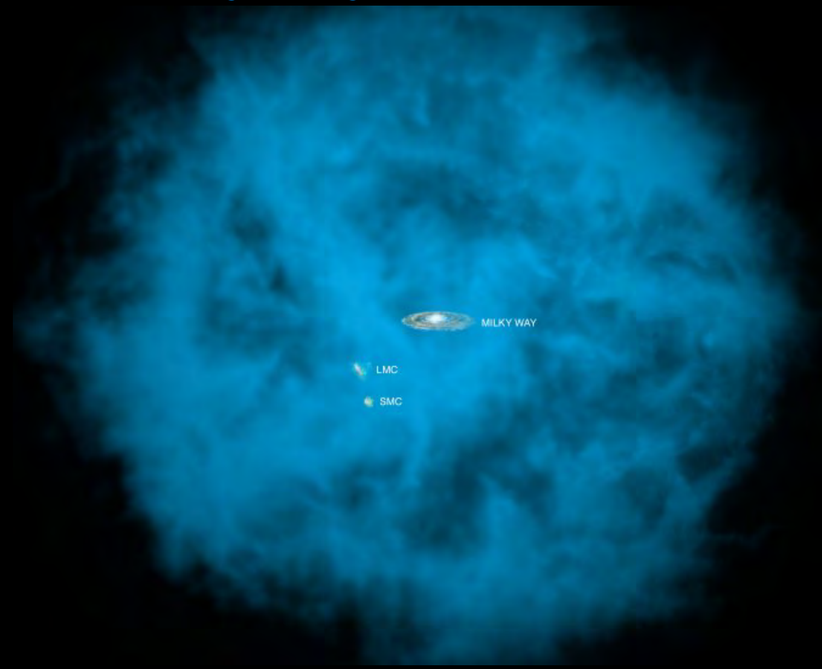


Drag from Milky Way's Hot Corona

- MW is surrounded by hot gas (~1 million degrees)
- Leading Arm gas experiences *drag* as moves through

➡ but *NOT* the stars

Milky Way's Hot Corona



Credits: NASA/CXC/M.Weiss; NASA/CXC/Ohio State/A.Gupta et al.

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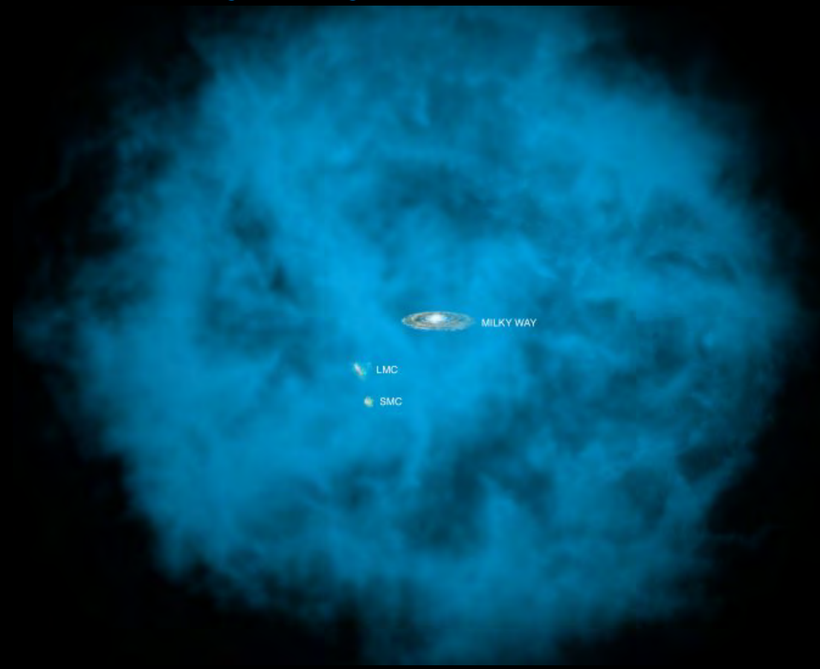
- Over time, gas slows down and falls behind stars

➡ spatial and velocity separation

Milky Way's Hot Corona



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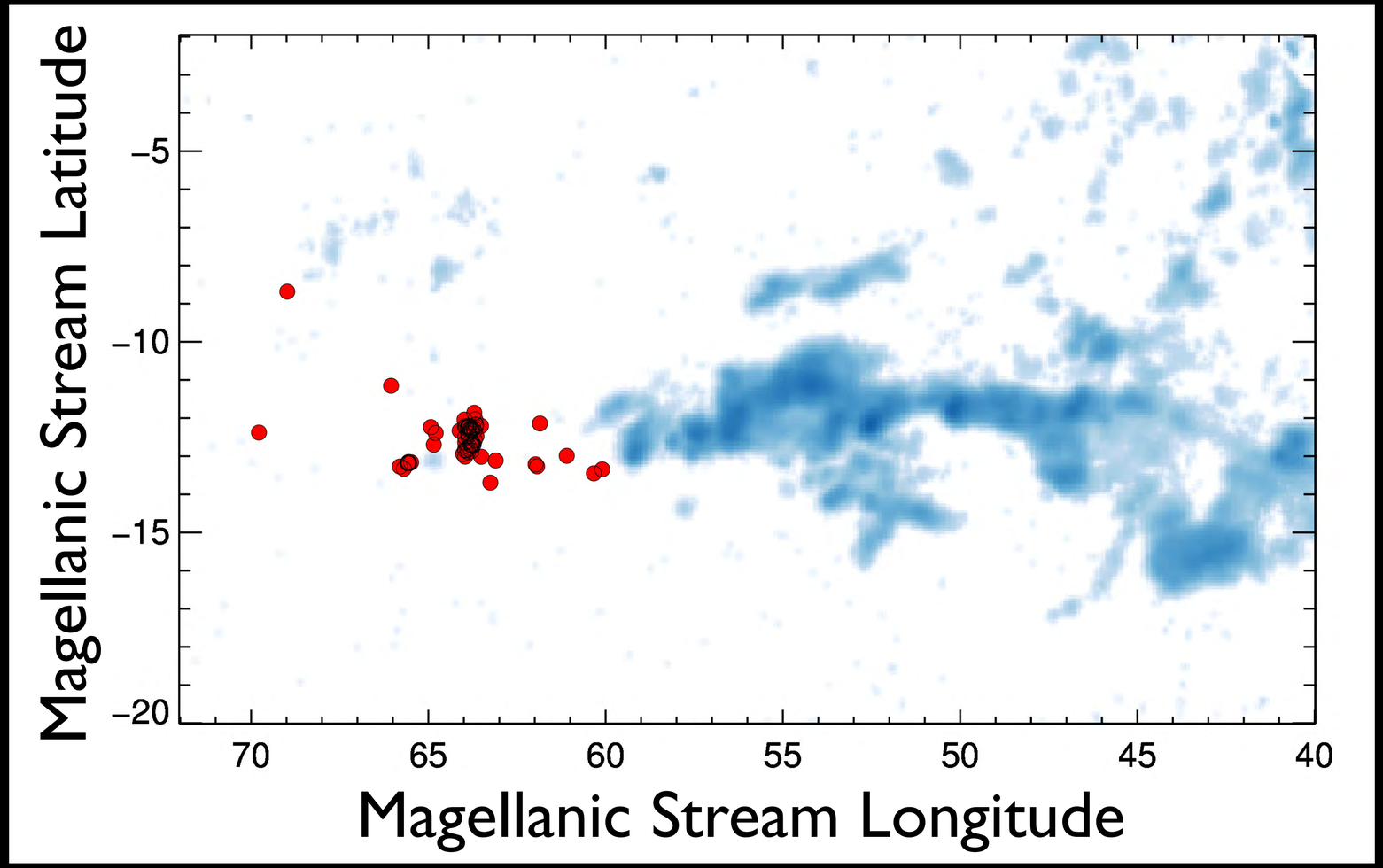
Spatial Offset



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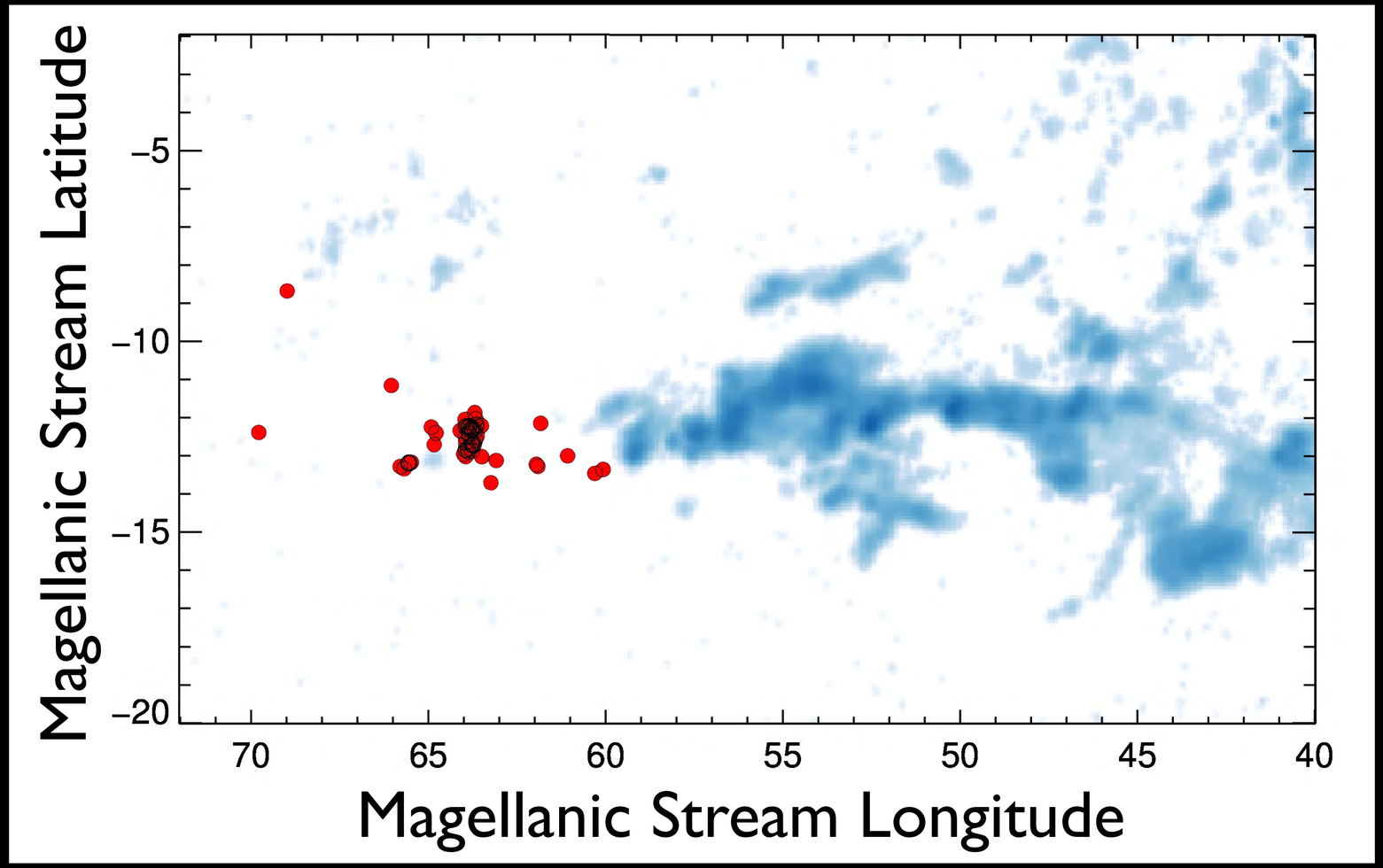

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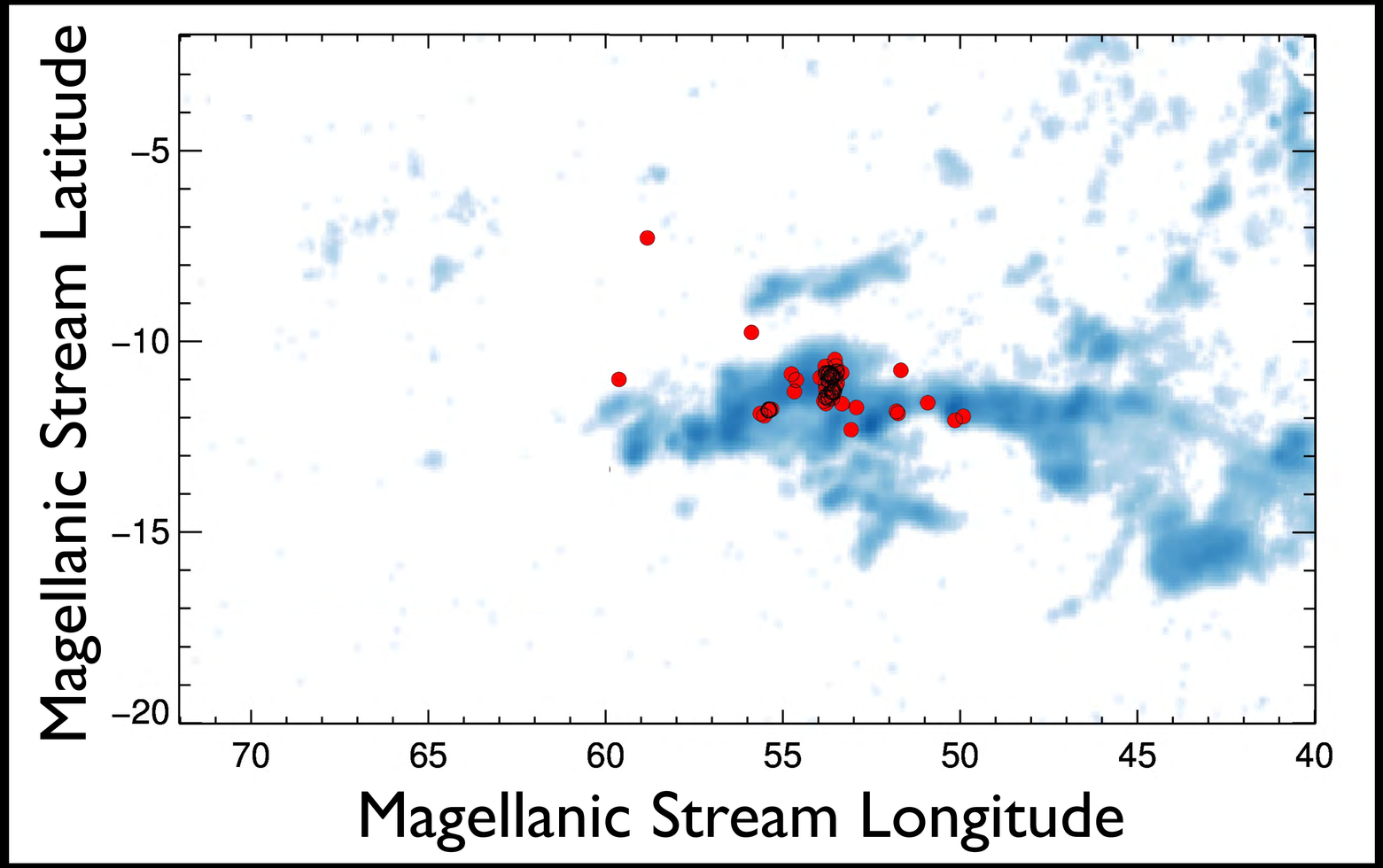

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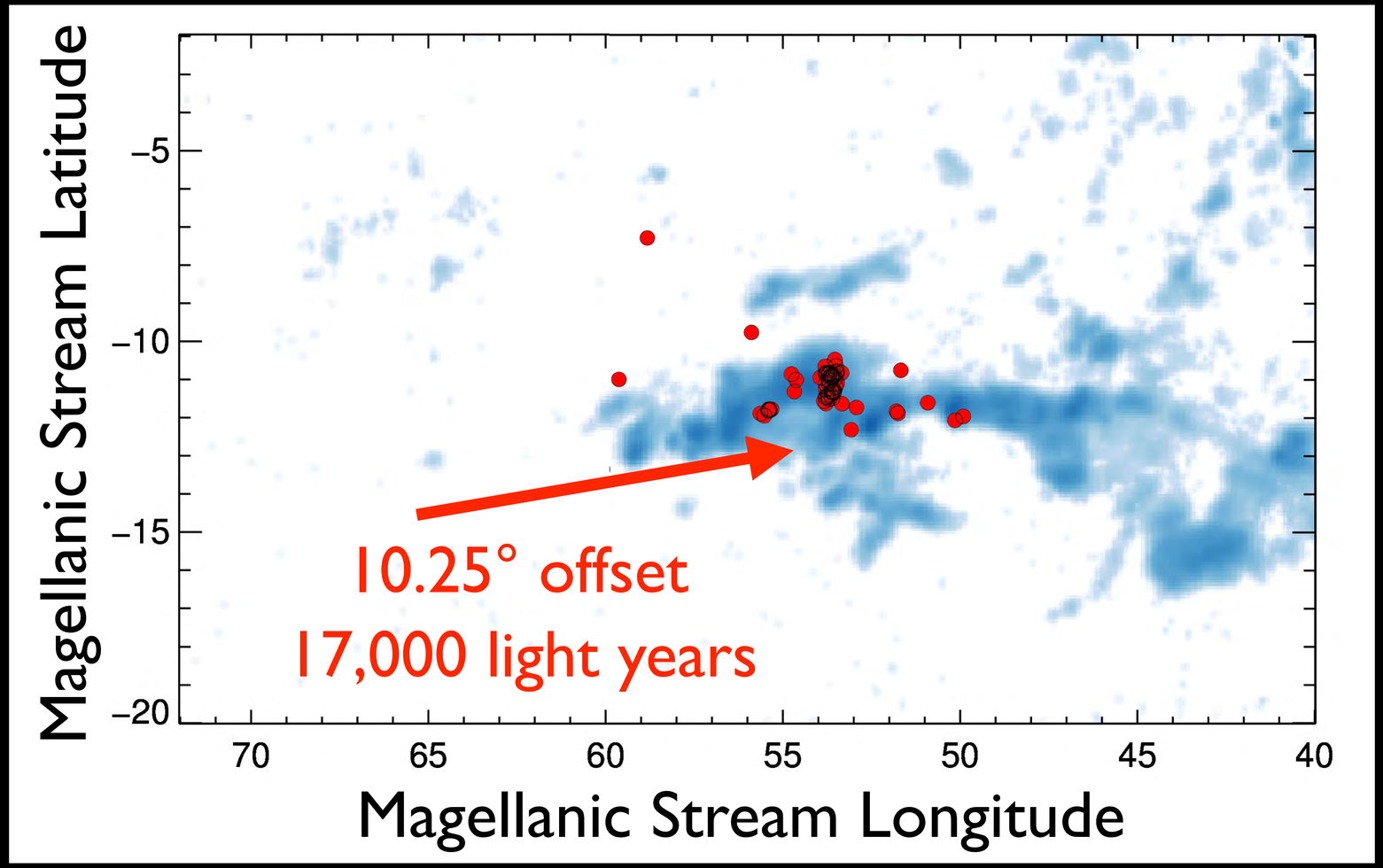
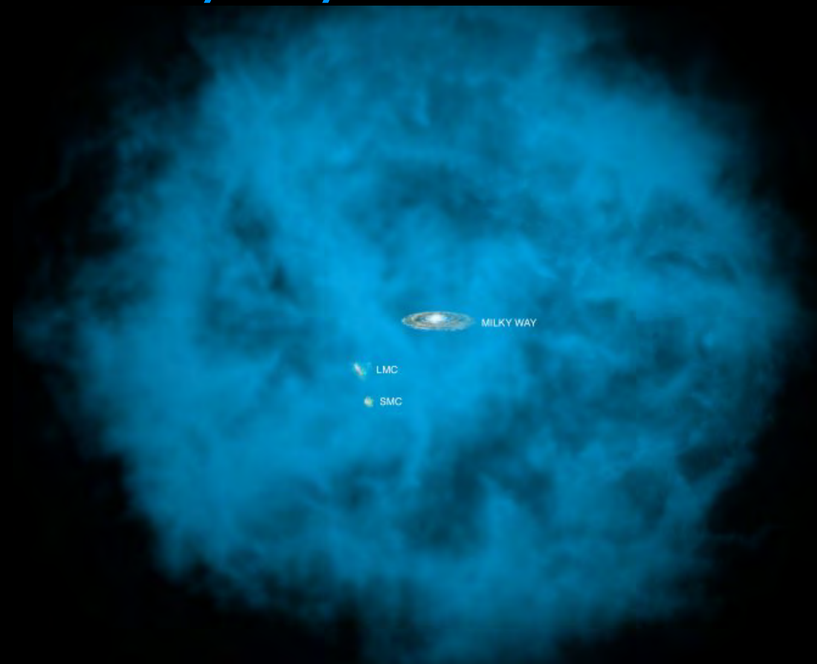


Drag from Milky Way's Hot Corona

- Used PW 1 velocity + offsets between stars/gas to determine MW hot halo density

➡ 10x more dense and massive than previously thought

Milky Way's Hot Halo Gas



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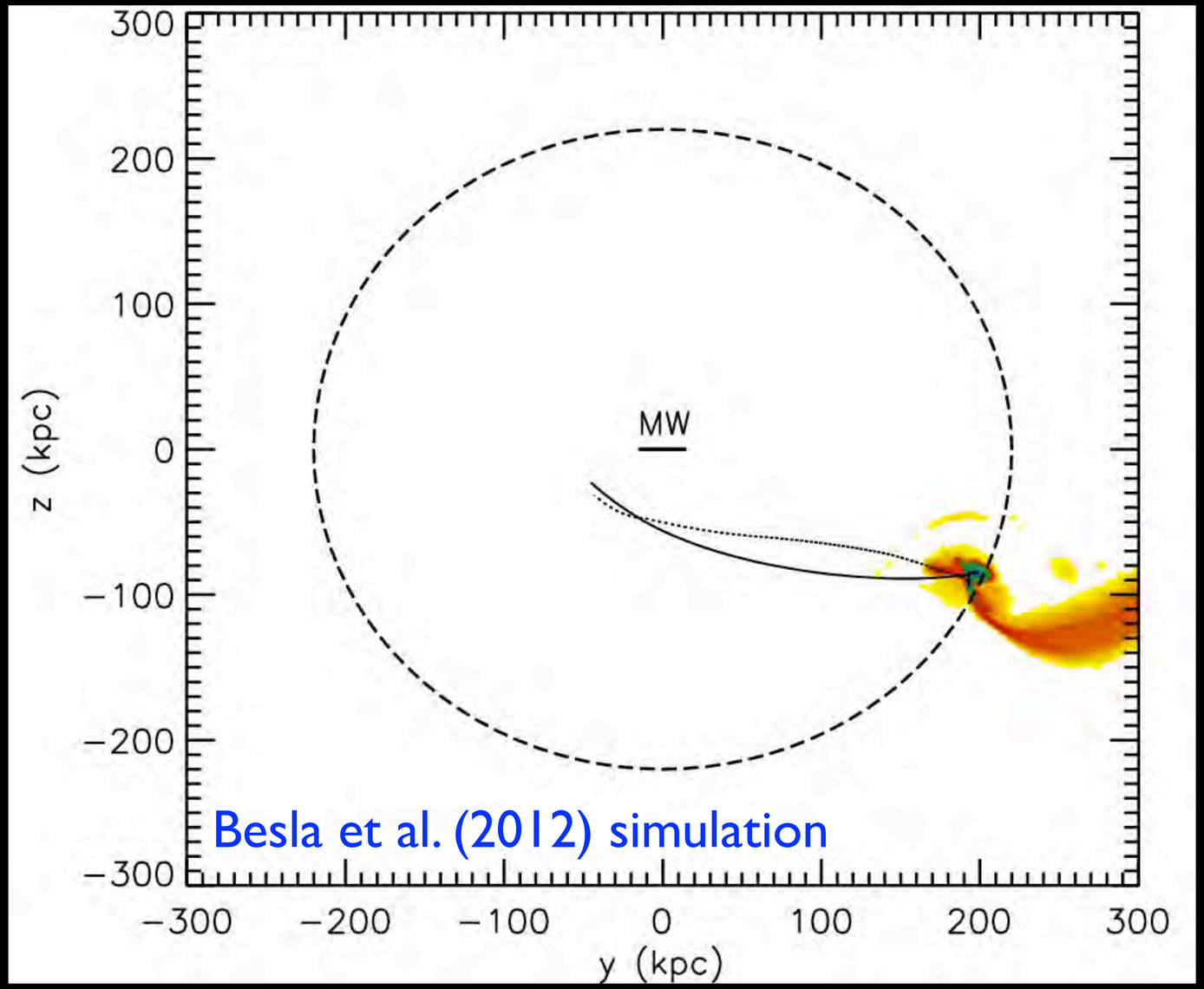
Magellanic Merger



- Leading Arm distance closer than previously thought
- Merging will happen sooner than expected

Price-Whelan, Nidever et al. (2019)

Summary

Nidever, Price-Whelan et al. (2019)

- Star Formation: First detection of stars born in the Magellanic Stream.
- Milky Way's Hot Corona: Used spatial offset between stars and gas to measure density of Milky Way's hot gaseous corona.

  ➡ *More dense and massive than previously thought.*
- Nearby: Leading Arm distance accurately measured and *closer than expected*.
- Merge Soon: Magellanic Clouds and Stream will merge with the Milky Way sooner than expected and replenish the Milky Way's gas "reservoir".

Adrian Price-Whelan and David Nidever

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