DSES Science Meeting
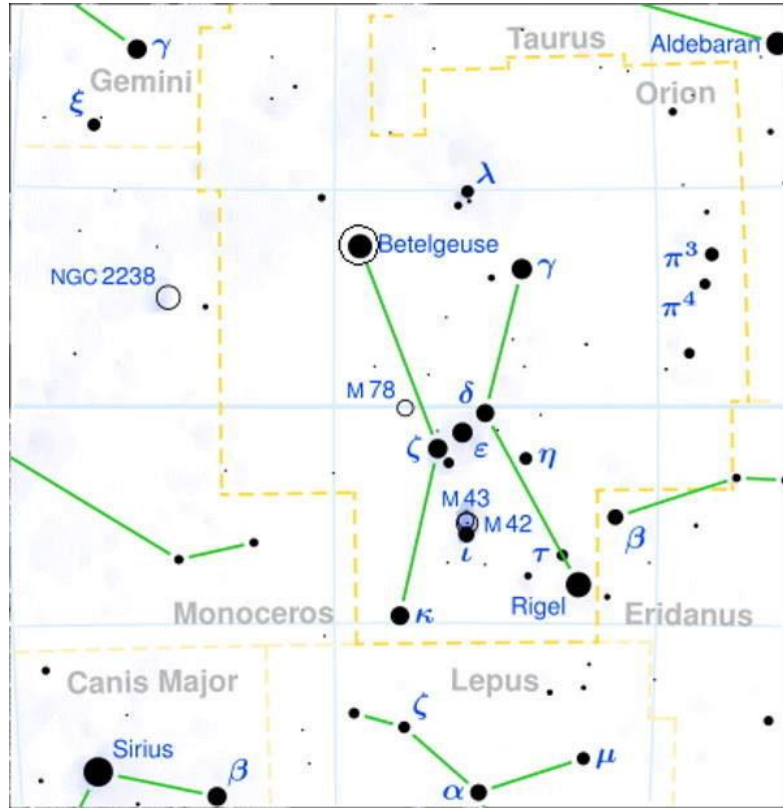
February 24, 2020

Dr. Rich Russel

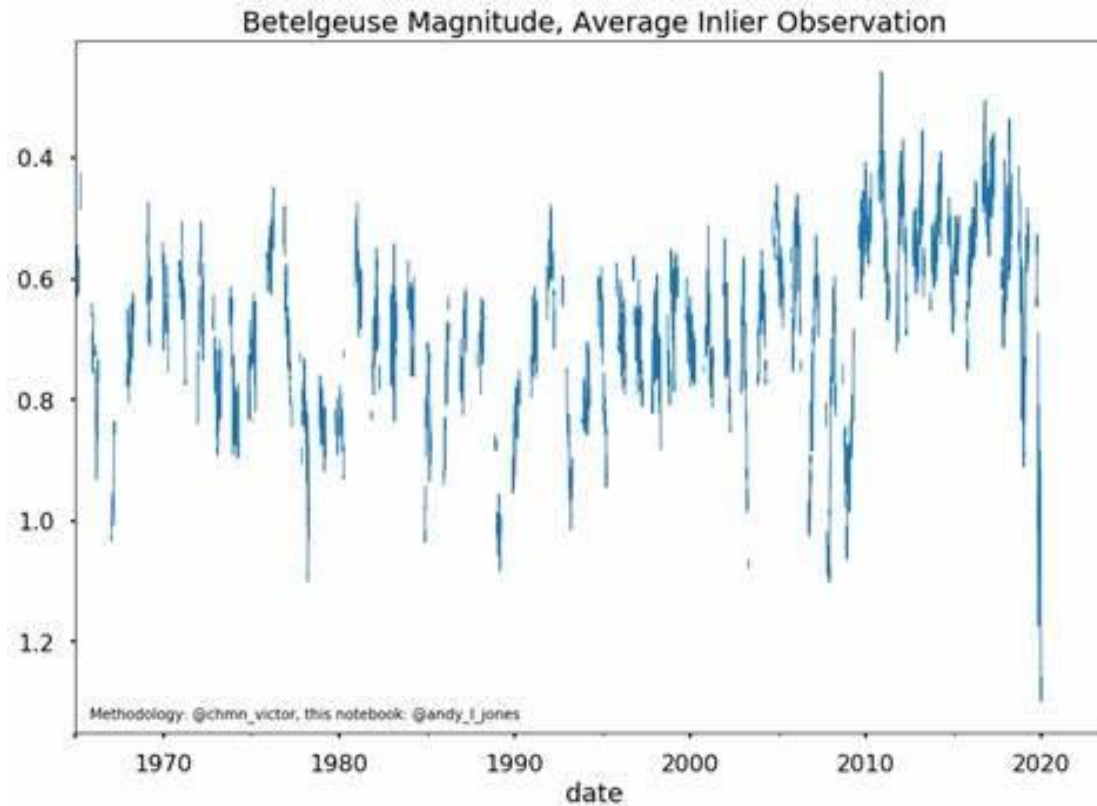DrRichRussel@Netscape.net

Agenda

- Betelgeuse dimming experiment

- Pulsar Observation status

- Latest DSES papers and presentations

Betelgeuse (Orion Constellation)

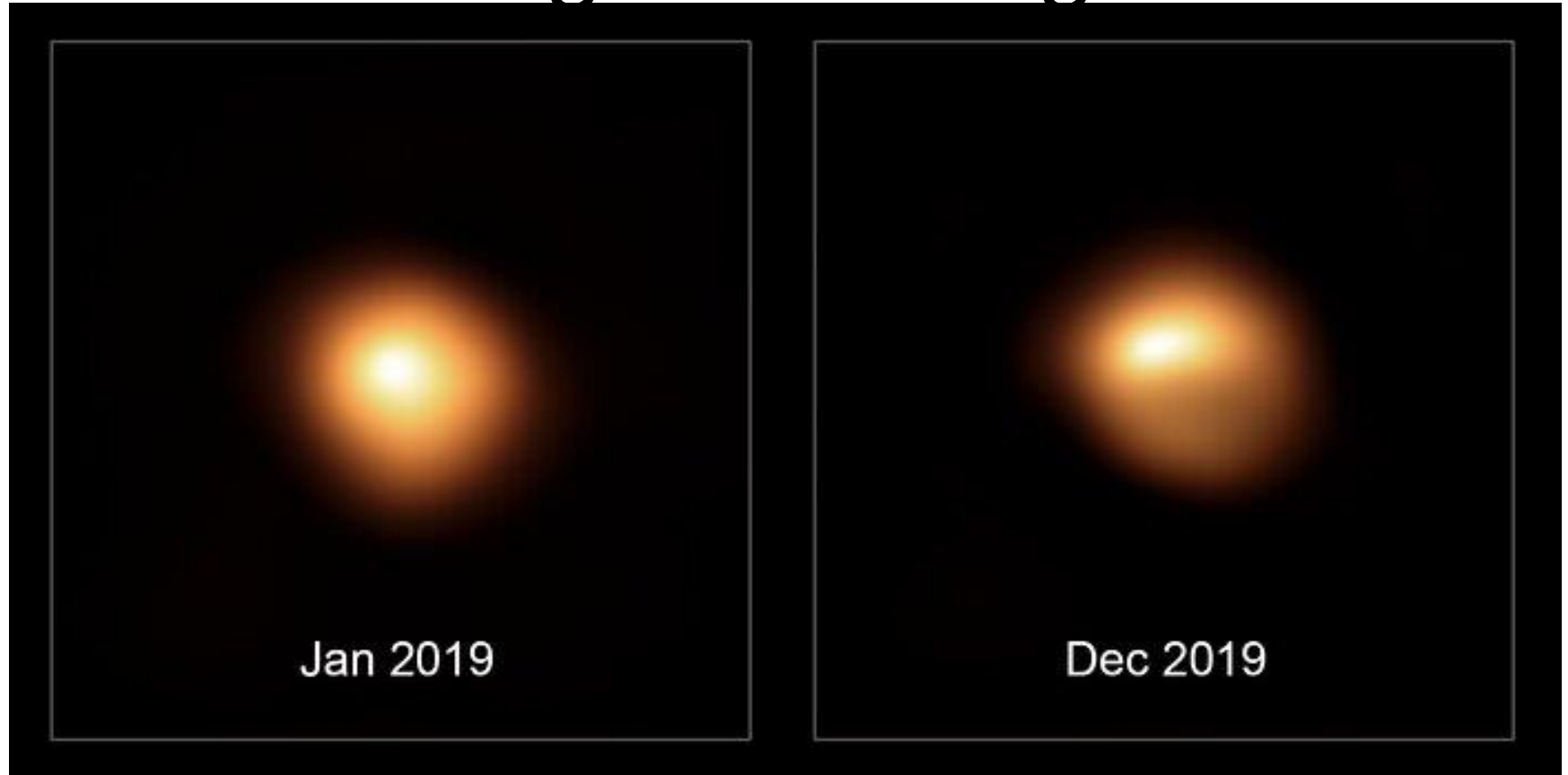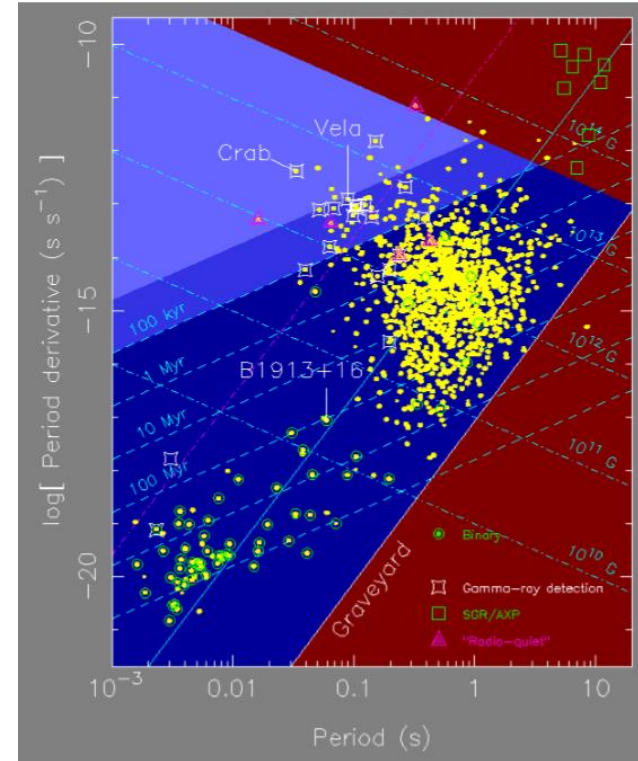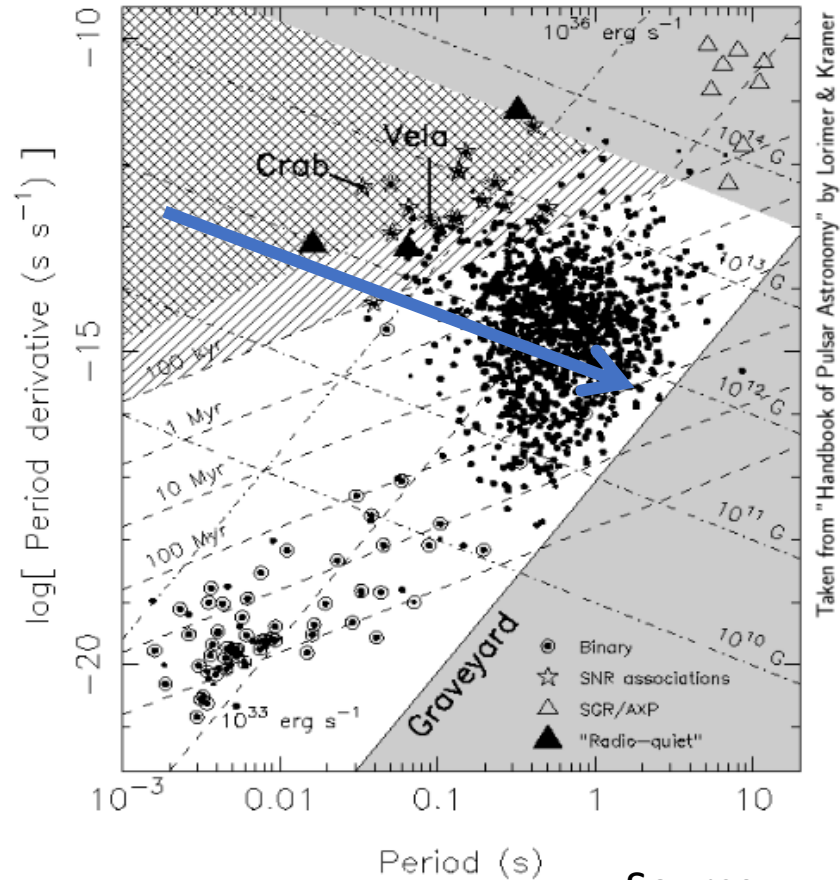

Source: Wikipedia

Magnitude Variation

Betelgeuse Magnitude, Average Inlier Observation

Source: https://www.severe-weather.eu

Betelgeuse Images

Jan 2019

Dec 2019

Life Prediction

Source: www.Wikipedia.org

Quick Speed estimate

- Radius of Betelgeuse – $R_{Jupiter-Sun}$ = 778,547,200km

- Measure distance from Edge of cloud to center of Betelgeuse

.   = 1.4 x $R_{Jupiter-Sun}$ = 1,089,966,080 km

- Date of Image: 27 Feb 2014

- Estimate (t) seconds = 6years = 6x365x24x3600 = 189,216,000 seconds

- Estimated speed of cloud = $R_{Jupiter-Sun}$/t = 4.115 km/s

- Well within speed possibilities!!!!

Target Cloud?

Real or Image artifact?
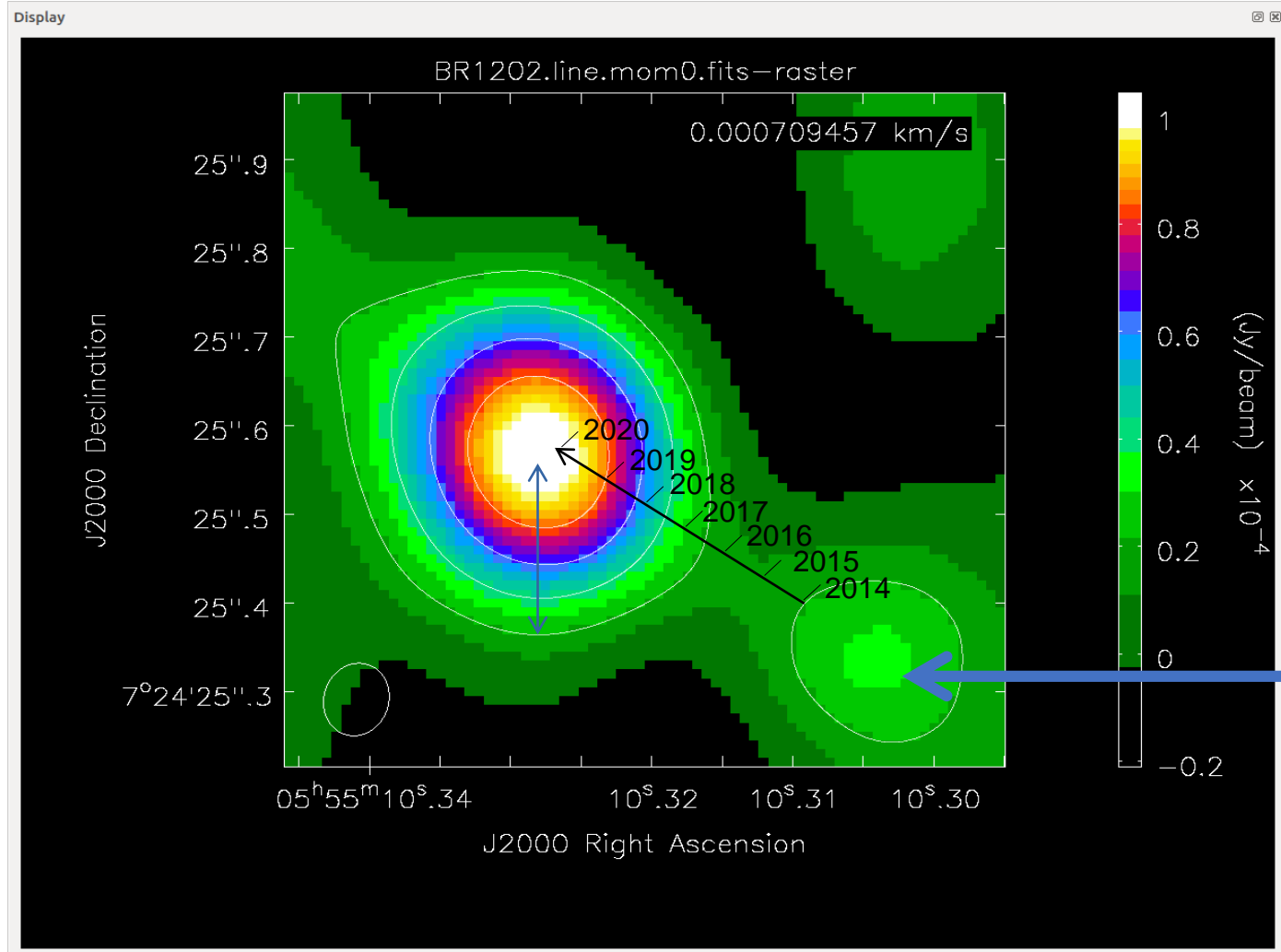
Betelgeuse (Alpha Orionis) Coordinates

Basic data :

* alf Ori -- Red supergiant star

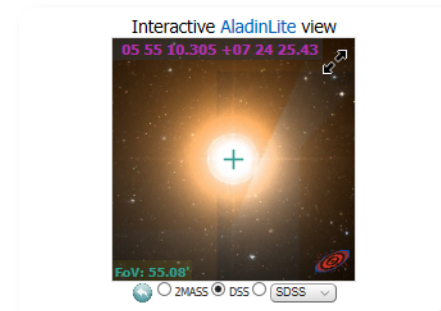|	
Other object types:	* (*,AG,...), IR (EIC,IRAS,...), ** (**,ADS,...), V* (V*,AAVSO), smm (JCMTSE,JCMTSF), s*r (Ref), LP* (Ref), FIR (Ref), UV (TD1)
ICRS coord. *(ep=J2000)* :	05 55 10.30536 +07 24 25.4304 (Optical) [9.04 5.72 90] A 2007A&A...474..653V
FK4 coord. *(ep=B1950 eq=1950)* :	05 52 27.79597 +07 23 57.8110 [9.04 5.72 90]
Gal coord. *(ep=J2000)* :	199.78723027 -08.95860566 [9.04 5.72 90]
Proper motions *mas/yr* :	27.54 11.30 [1.03 0.65 0] A 2007A&A...474..653V
Radial velocity / Redshift / cz :	V(km/s) 21.91 [0.51] / z(~) 0.000073 [0.000002] / cz 21.91 [0.51]
	A 2005A&A...430..165F
Parallaxes *(mas)*:	6.55 [0.83] A 2007A&A...474..653V
Spectral type:	M1-M2Ia-Iab B 1989ApJS...71..245K
Fluxes (8) :	U 4.38 [~] C 1966CoLPL...4...99J
	B 2.27 [~] C 1966CoLPL...4...99J
	V 0.42 [~] C 1966CoLPL...4...99J
	R -1.17 [~] C 2002yCat.2237....0D
	I -2.45 [~] C 2002yCat.2237....0D
	J -3.00 [~] C 2002yCat.2237....0D
	H -3.73 [~] C 2002yCat.2237....0D
	K -4.05 [~] C 2002yCat.2237....0D

SIMBAD query around with radius 2 arcmin

Interactive AladinLite view

05 55 10.305 +07 24 25.43

FoV: 55.08'

2MASS DSS SDSS

VizieR photometry viewer

Search within radius May 30 arcsec

Source: http://simbad.u-strasbg.fr/simbad/
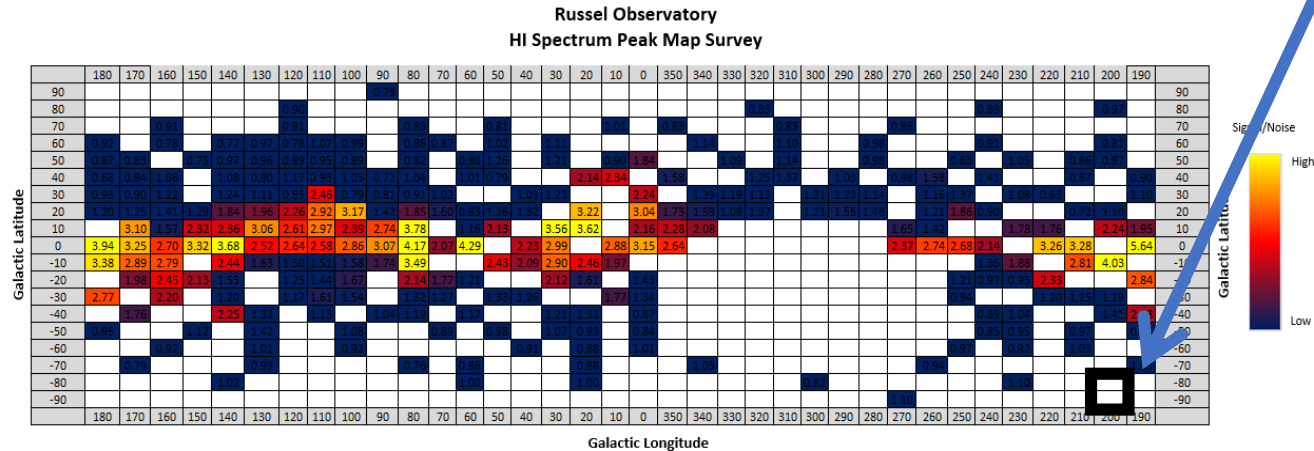
HI Drift Scan using 9-ft Dish at Russel Observatory
September 2019

Celestial Coordinates
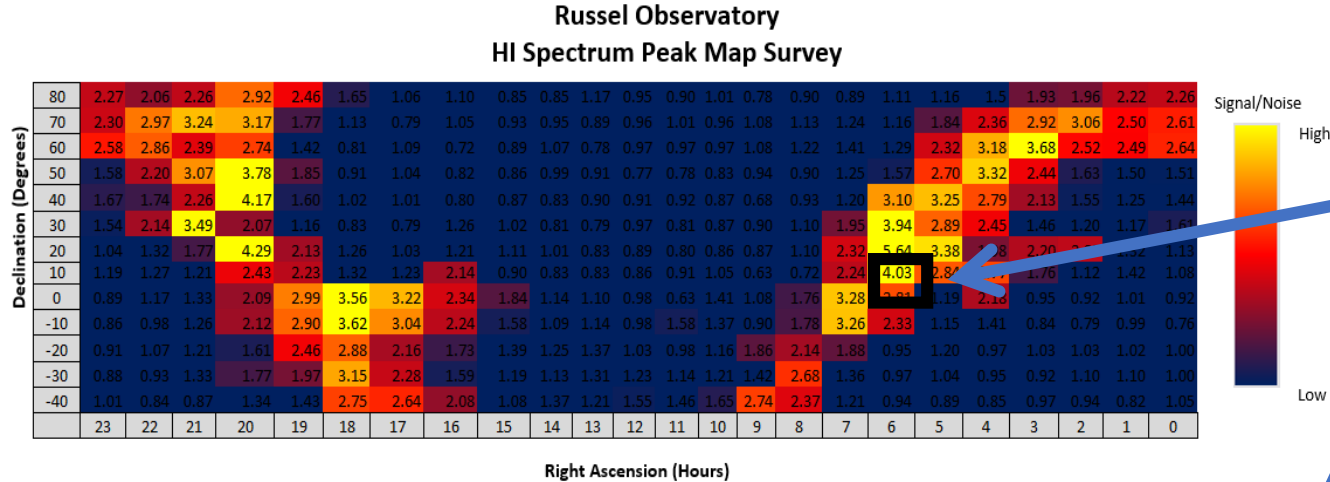
Galactic Coordinates

Betelgeuse

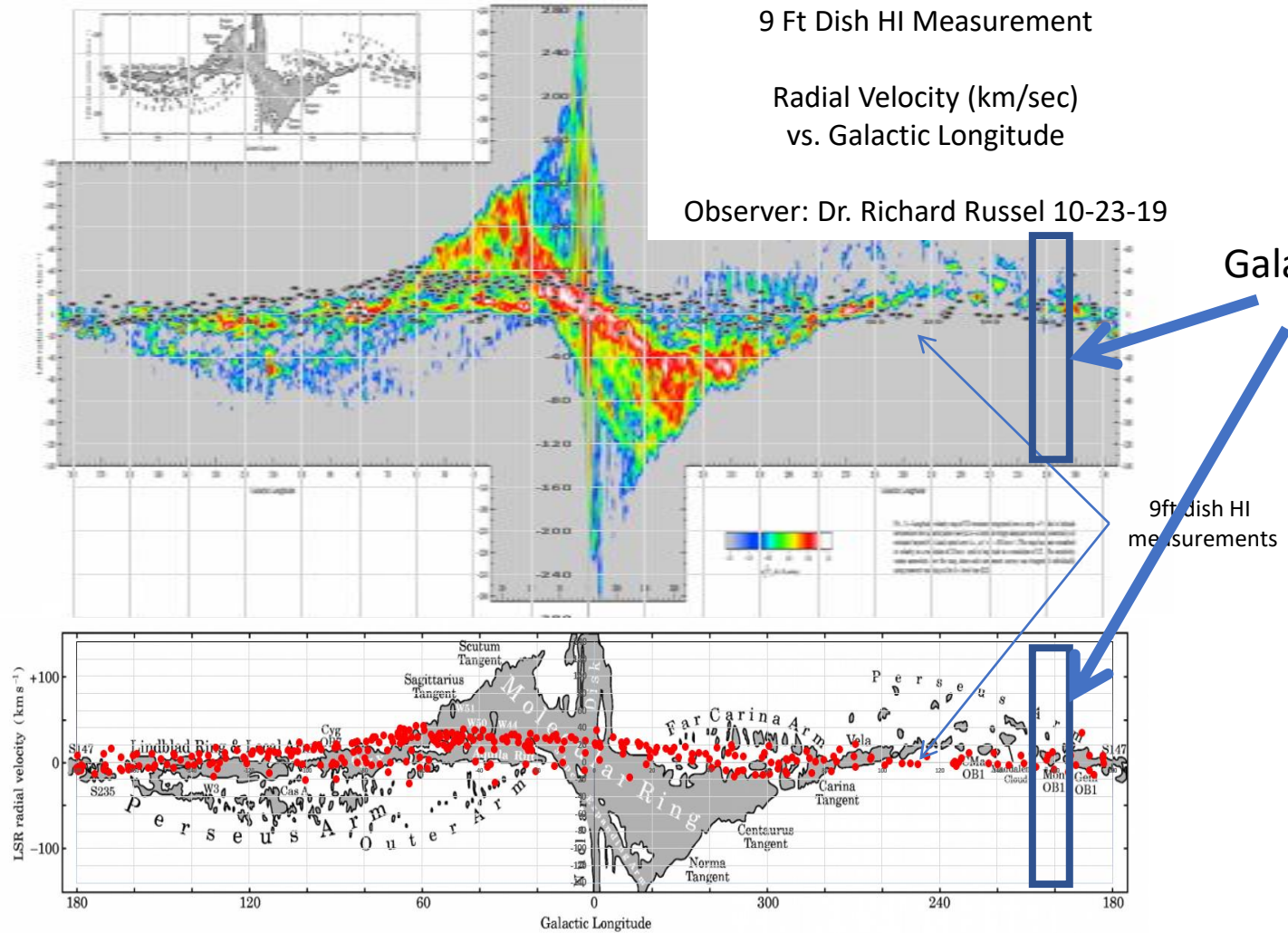9 Ft Dish HI Measurement

Radial Velocity (km/sec)
vs. Galactic Longitude

Observer: Dr. Richard Russel 10-23-19

Betelgeuse
Galactic Longitude

9ft dish HI
measurements

Background images obtained at:

https://www.britannica.com/place/Milky-Way-Galaxy/The-structure-and-dynamics-of-the-Milky-Way-Galaxy

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Next Steps

- Find other images of Betelgeuse and see if "cloud" is visible and is moving

- Start taking H1 measurements of Betelgeuse with 9 ft and 60 ft dish – compare with baseline values from 2019
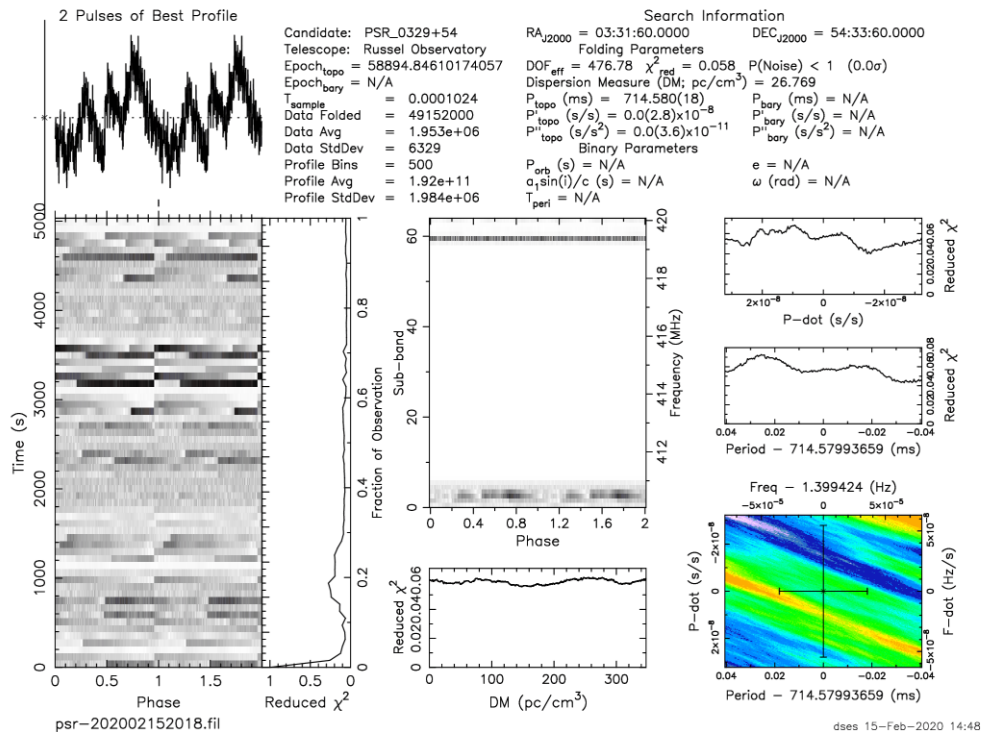
Pulsar Observation Status

DSES Observations

- Observed with 60 ft dish

- Results – no pulsar detected

- Possible issues:
  - Gain on antenna
  - Collection software
  - SDR settings
  - Processing approach

DSES VS K5SO

Pulsar Next Steps
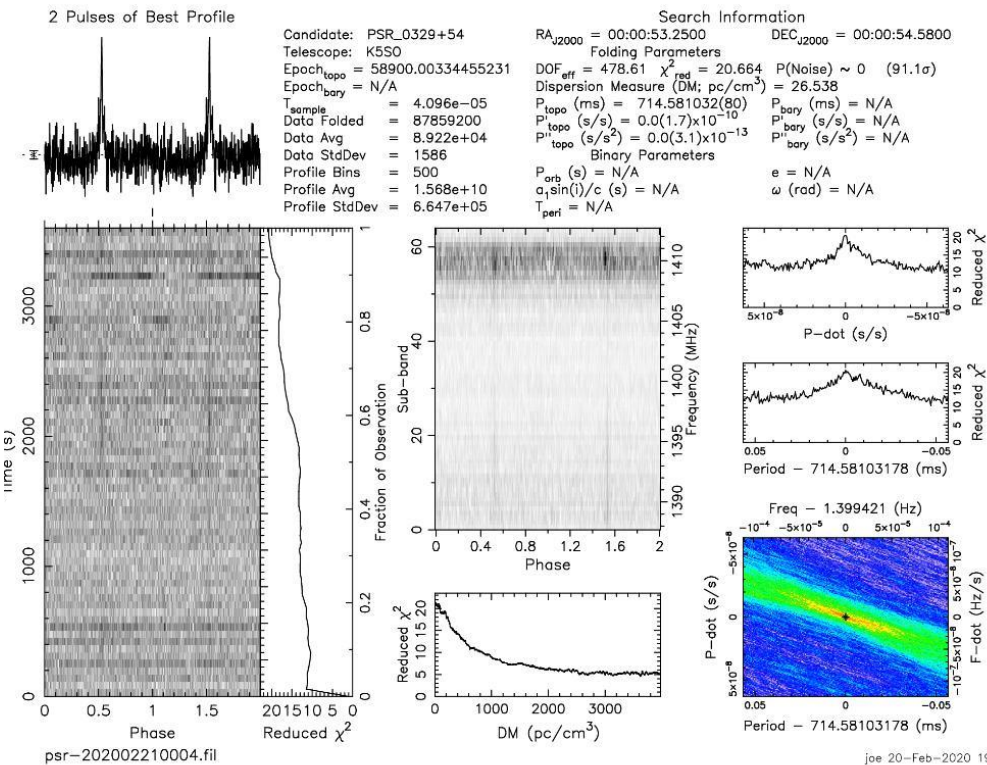
- Reinstall Yagi pulsar system

- Take SDR and laptop to Joe Martin's house after SARA Conference
  - Hook up to his antenna system and verify that the SDR/computer software works properly

- Haswell – bring some amplification for next try

SARA West Papers

Reducing Observations from the JVLA, ALMA, ATCA and EVLBI Radio-Telescope Archives
Dr. Richard A. Russel

The large interferometry antenna systems maintain online archives of all of the observations conducted through their history. These observations can be processed (reduced) using CASA software. The results provide images of the astronomical objects as well as polarization, Jansky signal strength, relative velocity as well as chemical signature measurements. A number of archive files were downloaded and reduced. The analysis of the results, as well as the research on the astronomical objects, provides an excellent learning opportunity for the amateur radio astronomer.

SARA West Papers

Python Program for Mitigating Radio Frequency Interference Observed in SpectraCyber Receiver Drift Scan Data Files
Jon Ayres
Deep Space Exploration Society

The Colorado Springs Deep Space Exploration Society (DSES) is developing capability for collecting 21-cm HI Line drift scan data on the club's 60-foot parabolic dish antenna. Initial efforts have collected drift scans using a 9foot parabolic dish interfaced to a SpectraCyber I receiver. These initial scans show that HI Line data is being collected; however, the desired data includes corrupted samples caused by numerous Radio Frequency Interference (RFI) events and also exhibits signal level offsets thought to be due to component temperature changes. This initial progress report demonstrates and describes a method for automated removal of transient RFI events using a Python program that is part of the DSES drift scan development effort. This report also outlines future goals.

Alpha Centauri A, B & C Imaging using the ALMA Archive
Richard A. Russel
Deep Space Exploration Society

Abstract The ALMA archives contain observations of the Alpha Centauri star system. Alpha Centauri is important because it is the closest star system to Earth and may have a planet that is in the habitable zone. This paper provides a basic analysis of some of these observations that were downloaded and reduced by the author.

Questions?