

Metal-poor massive stars

What are they? Why to care? And... how can we find them?

Dorottya Szécsi

Assistant Professor

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Humboldt Fellow,

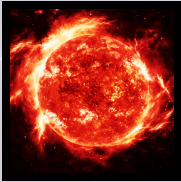
University of Cologne, Germany

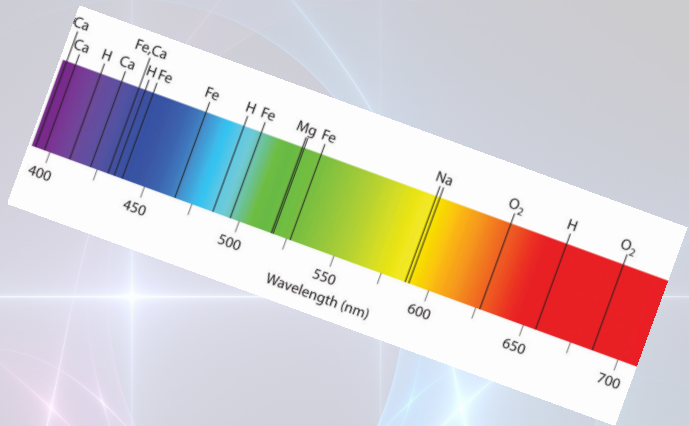


International Conference for Young Professionals in
Physics and Technology (ICYPPT)

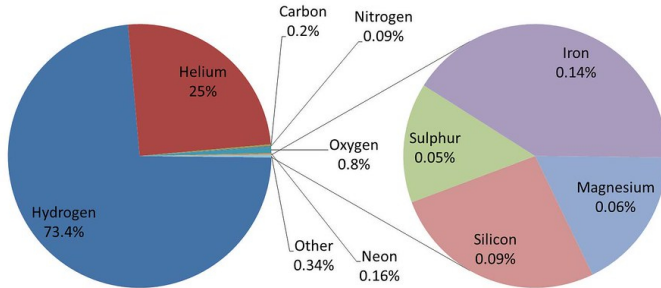
30th April 2021, Kharkiv, Ukraine



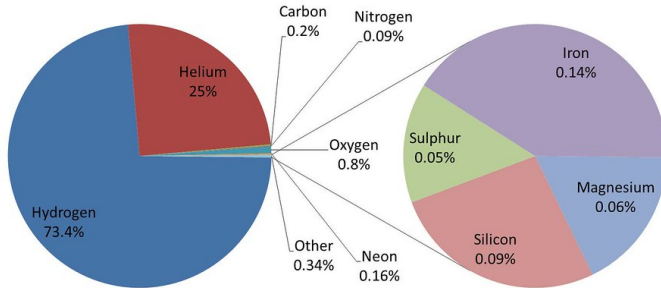




The Sun's composition



The Sun's composition

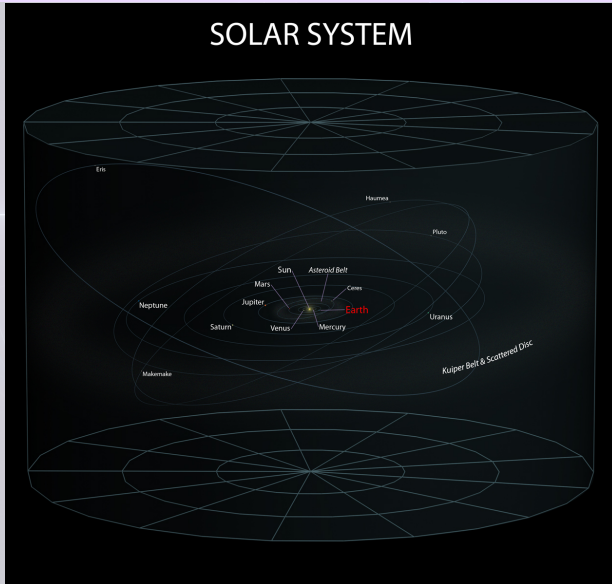


Less than 2% heavy elements,
i.e. *high* metal content, *metal-rich*

The Universe is pretty large though...

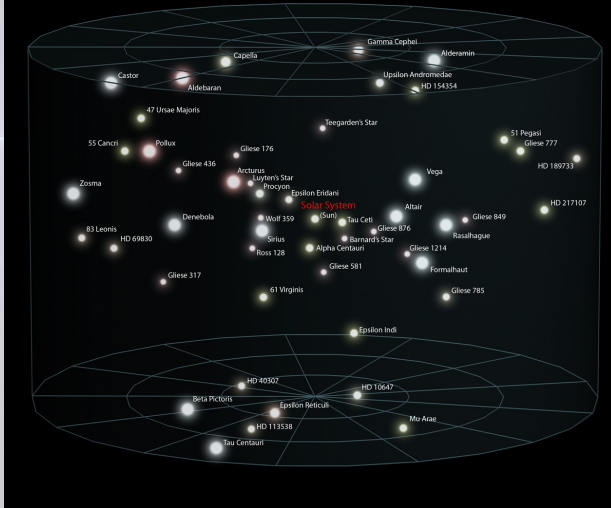


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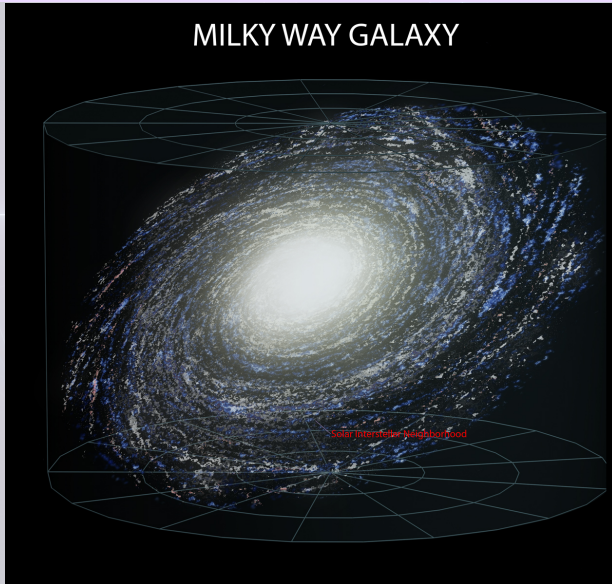


The Universe is pretty large though...

INTERSTELLAR NEIGHBORHOOD

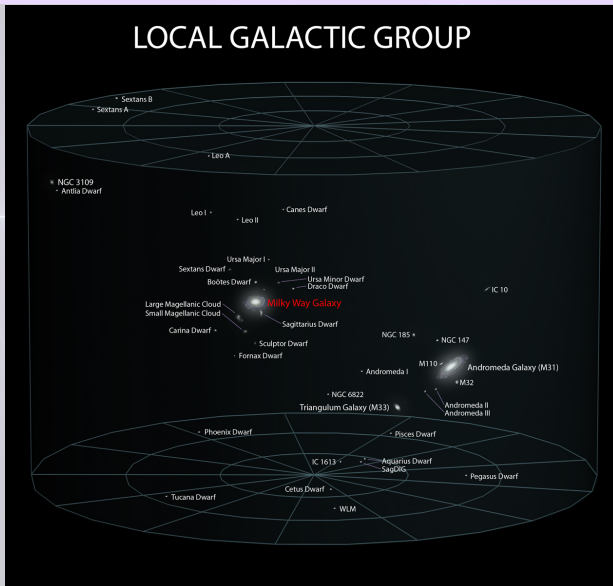


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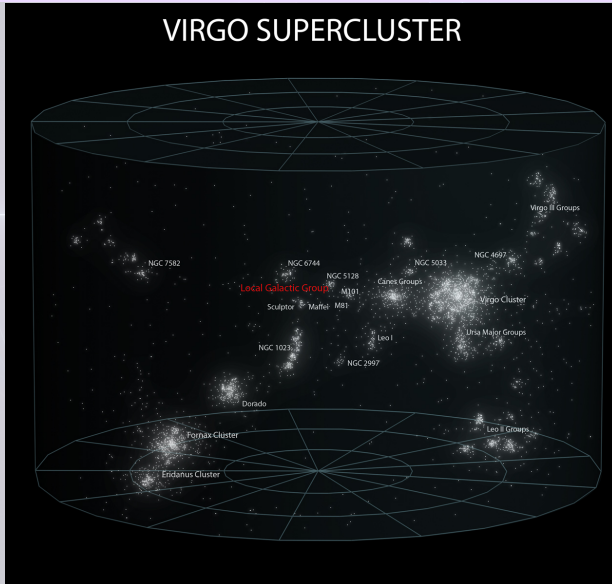


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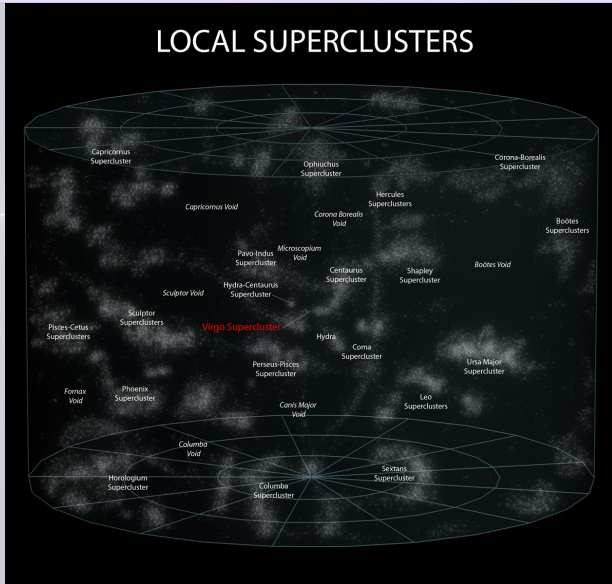
LOCAL GALACTIC GROUP



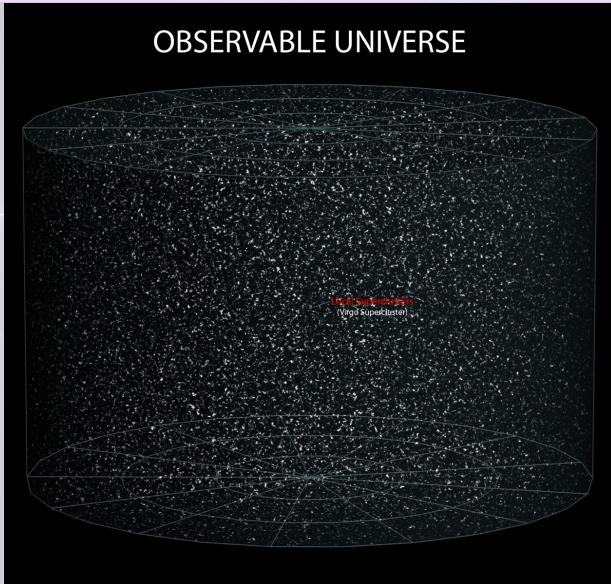
The Universe is pretty large though...



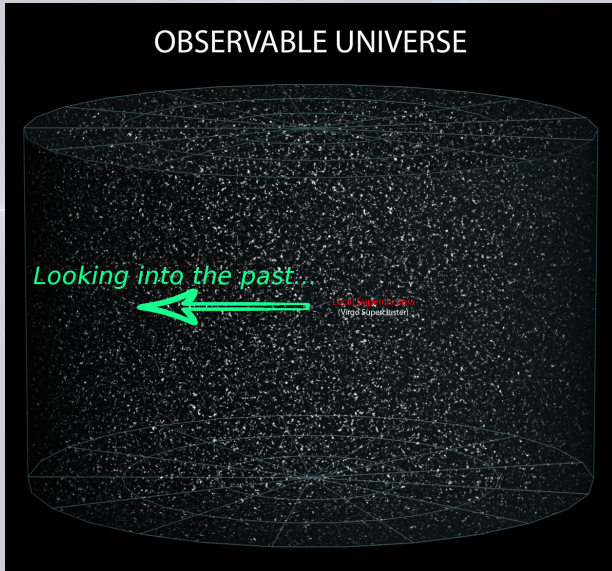
The Universe is pretty large though...



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The Universe is pretty large though...



Astronomers use big telescopes...



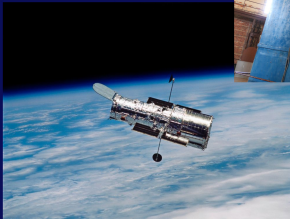
Astronomers use big telescopes...

...to measure **brightness** AND **color** of stars...



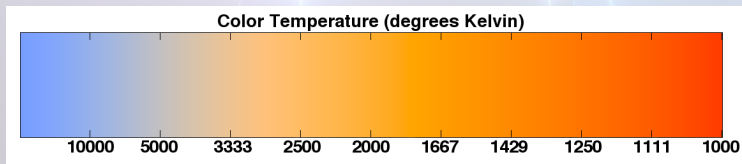
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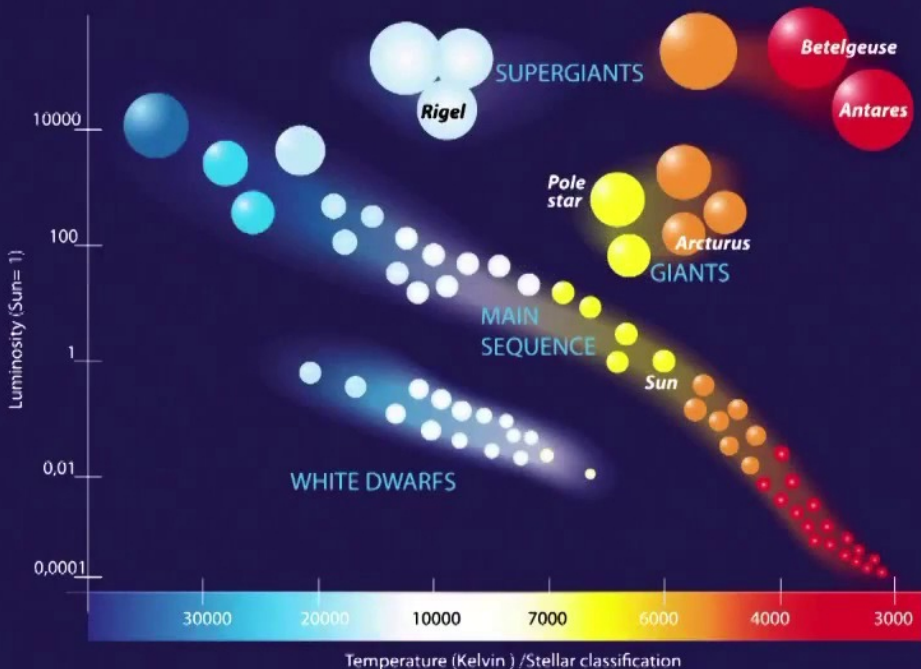
...to measure **brightness** AND **color** of stars...



Astronomers use big telescopes...

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Question:

SIZE vs. MASS

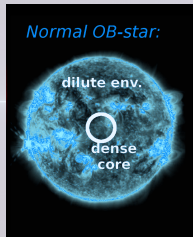
Are these the same?

No.

Metal-poor *massive* stars... theory

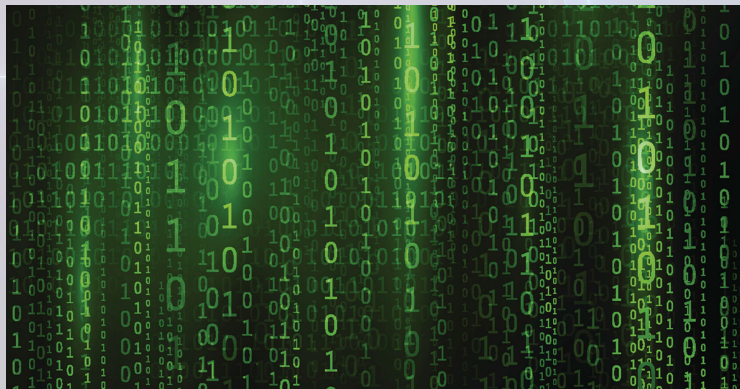
massive: > 8 times the Sun

– rare but influential



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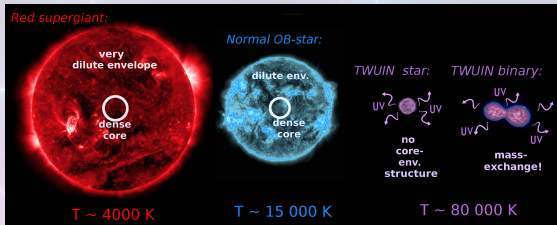
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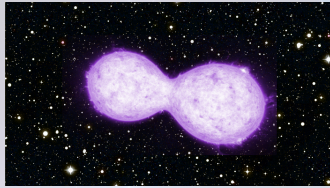
Metal-rich



Metal-poor: new stars predicted!

e.g. [Szécsi+15](#), [Szécsi+18](#), [Szécsi+19](#)

Gravitational waves... theoretical origin!



e.g. [Szécsi'17a](#)

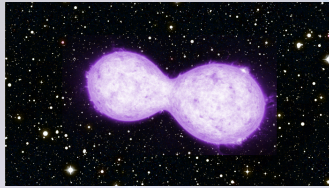
[Szécsi'17b](#)

Bagoly,[Szécsi+16](#)

Marchant+16,17

Gravitational waves... theoretical origin!

Life



Massive binaries

e.g. [Szécsi'17a](#)

[Szécsi'17b](#)

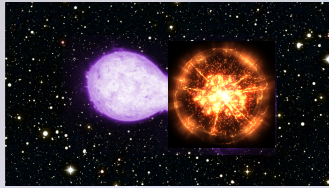
Bagoly,[Szécsi+16](#)

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Death



Massive binaries

Explosions

e.g. [Szécsi'17a](#)

[Szécsi'17b](#)

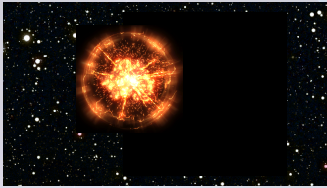
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Afterlife



Massive binaries

Explosions

2 Black Holes
(or Neutron Stars)

e.g. [Szécsi'17a](#)

[Szécsi'17b](#)

Bagoly,[Szécsi+16](#)

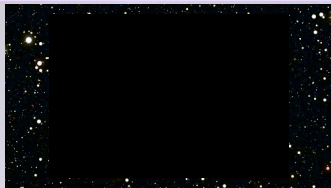
Marchant+16,17

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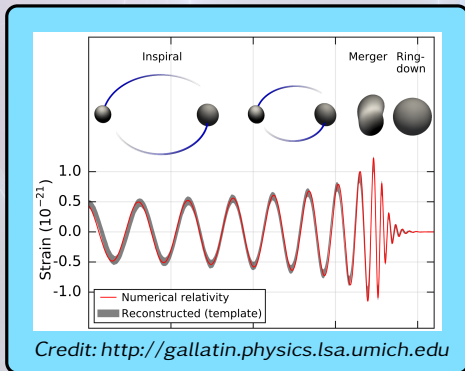
'Second
death'

e.g. [Szécsi'17a](#)

[Szécsi'17b](#)

[Bagoly, Szécsi+16](#)

[Marchant+16,17](#)



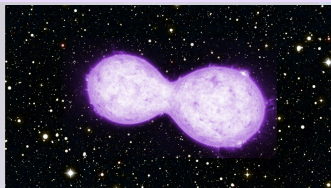
Merger

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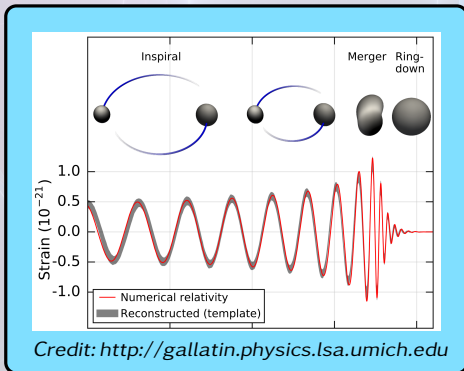
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[Marchant+16,17](#)



Merger

The background features a large, semi-transparent white circle in the center. Overlaid on this are several glowing, ethereal lines in shades of blue, cyan, and magenta. These lines form a complex, web-like pattern that resembles a molecular structure or a network diagram. The lines are thin and have a soft, glowing aura around them. The overall color palette is light and airy, with a mix of cool blues and warm pinks.

My research

Future plans...



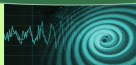
UNIwersytet
MIKOŁAJA KOPERNIKA
W TORUNIU

Future plans...

Dwarf galaxies



Gravitational waves



High-redshift Univ.



Gamma-ray bursts



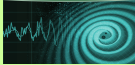
Globular clusters



Dwarf galaxies



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