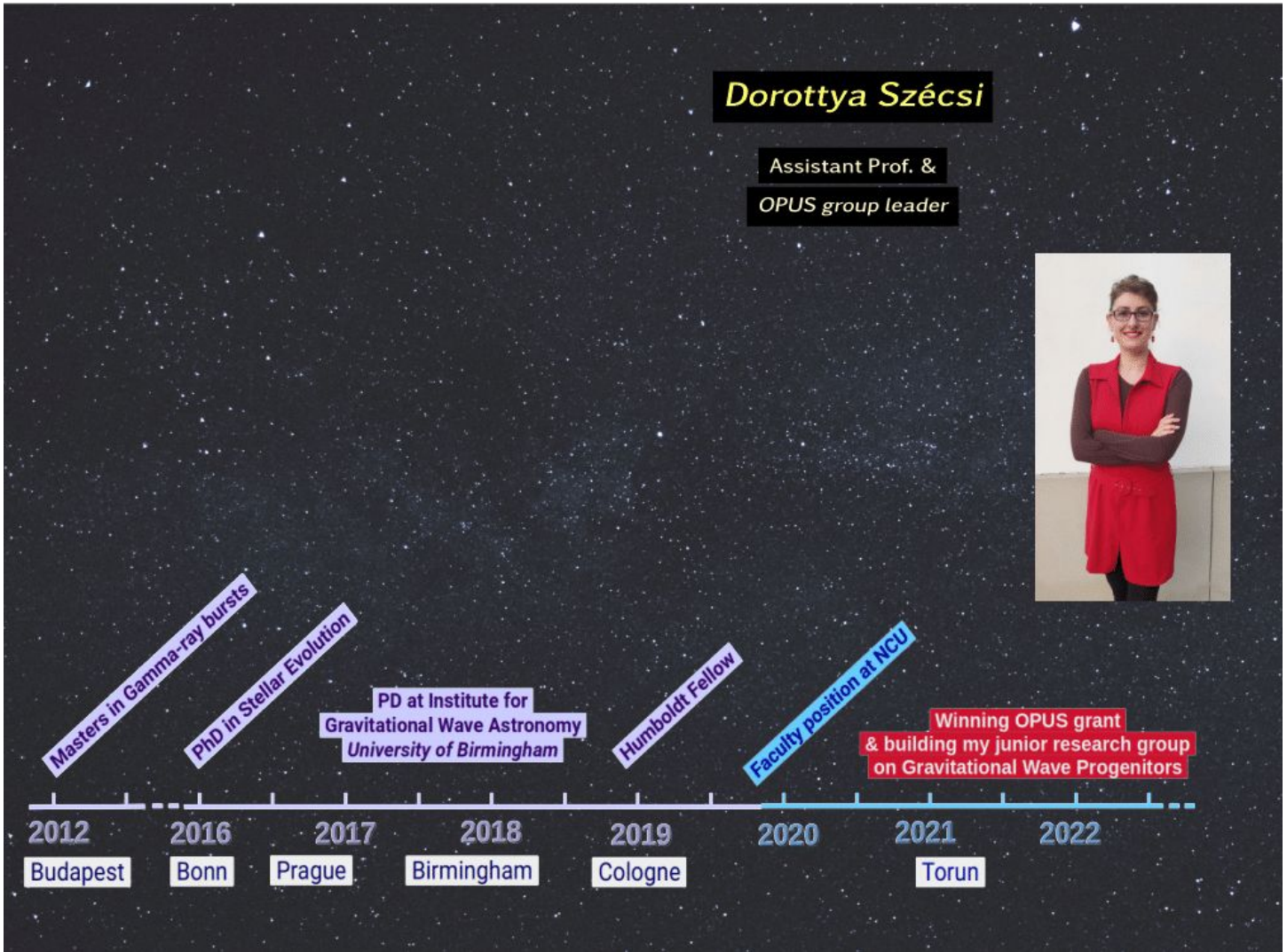
What do we know about...

Chemically-Homogeneously Evolving stars?

dr. hab. Dorottya Szécsi
(Nicolaus Copernicus University)

2024-04-24 GW Group Meeting
Flatiron Insitute, New York, USA



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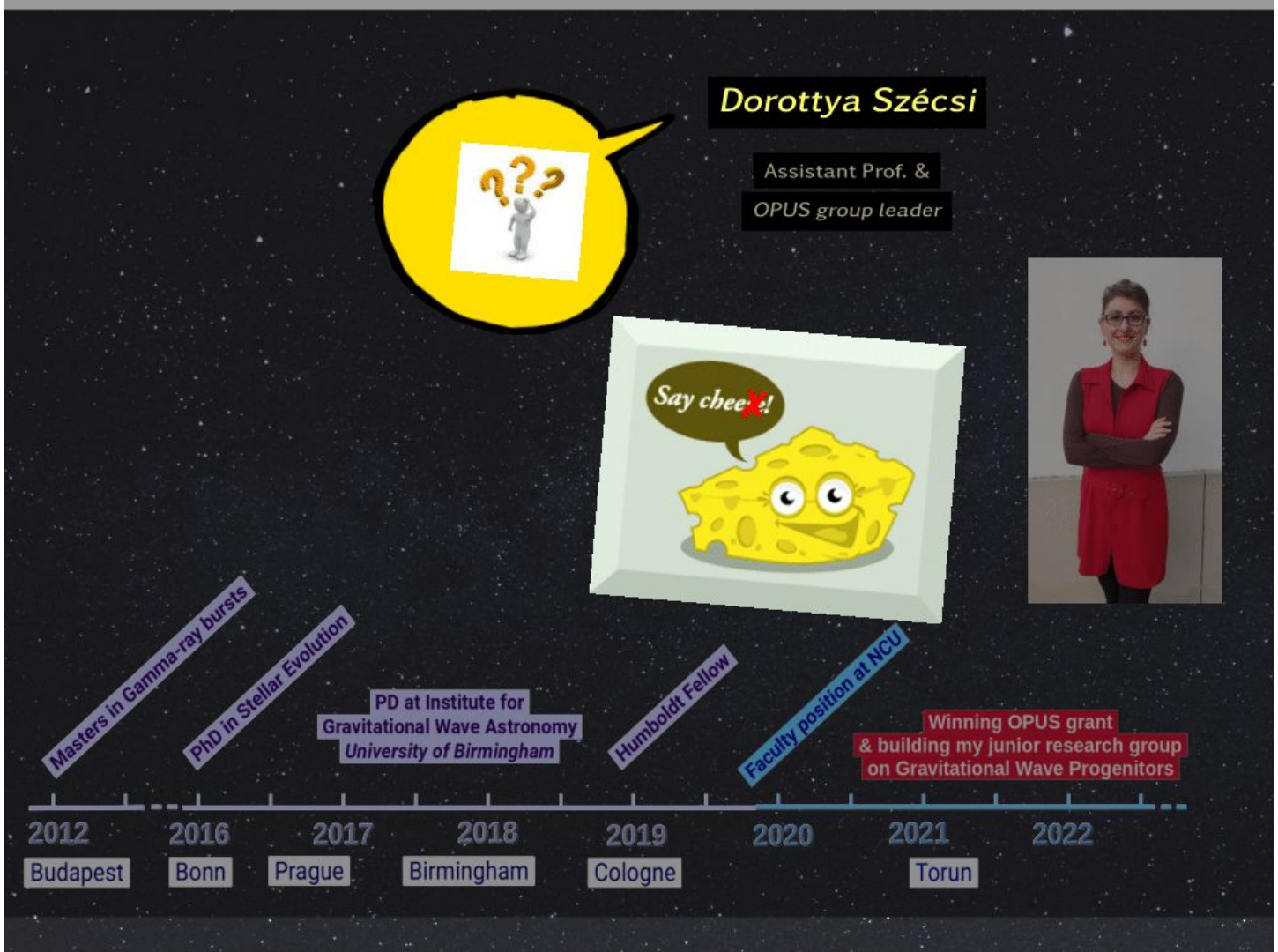

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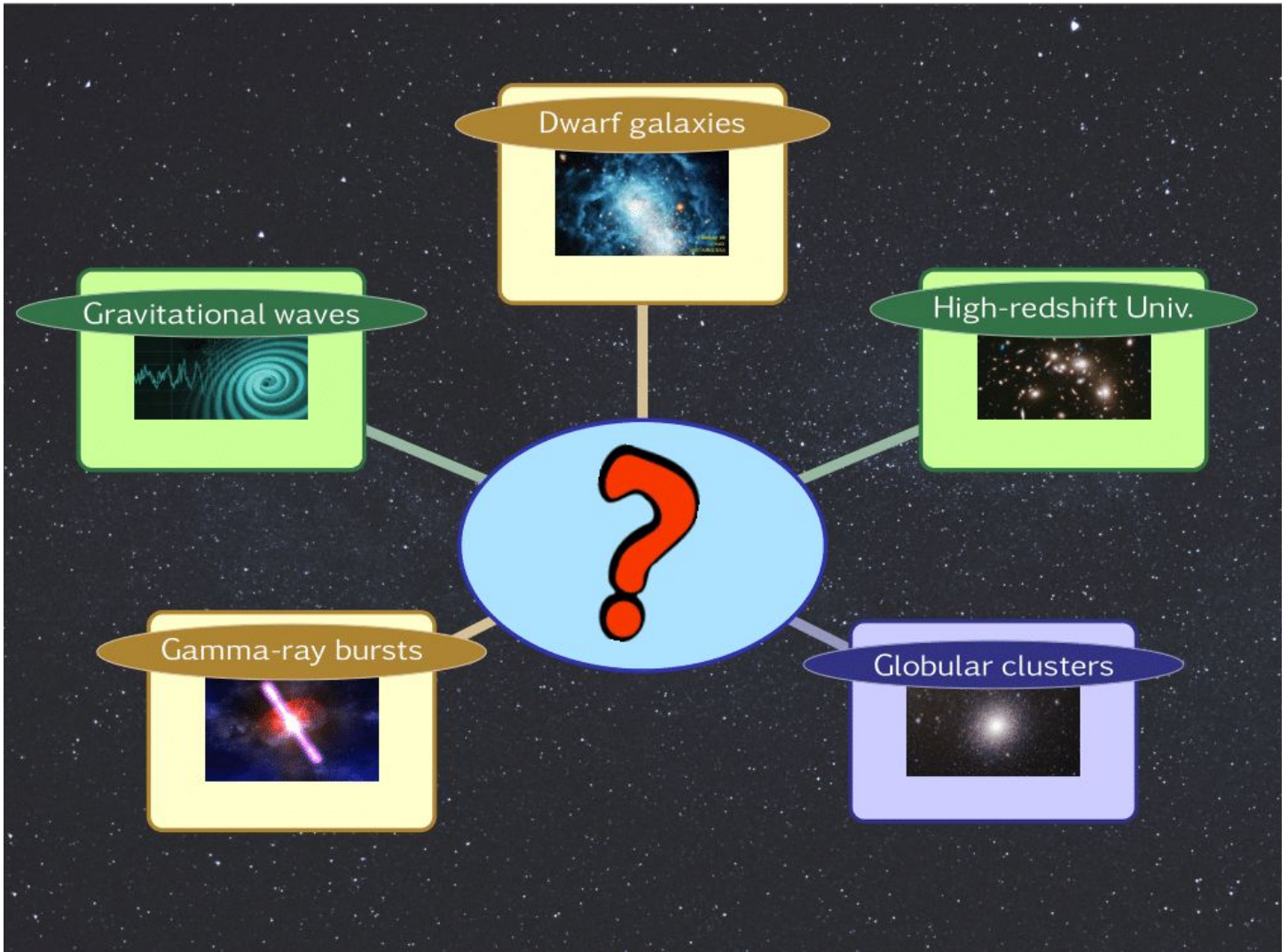

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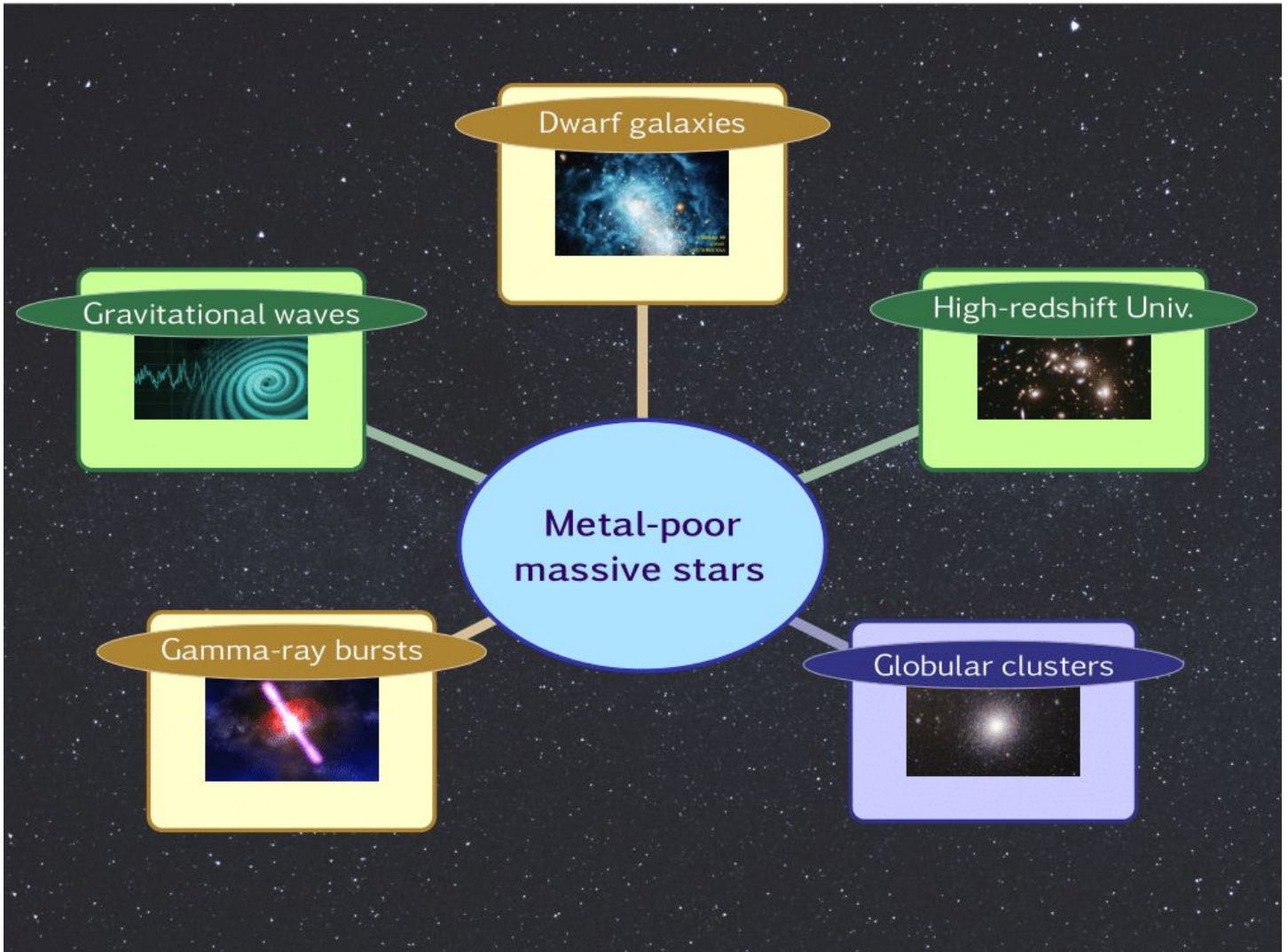

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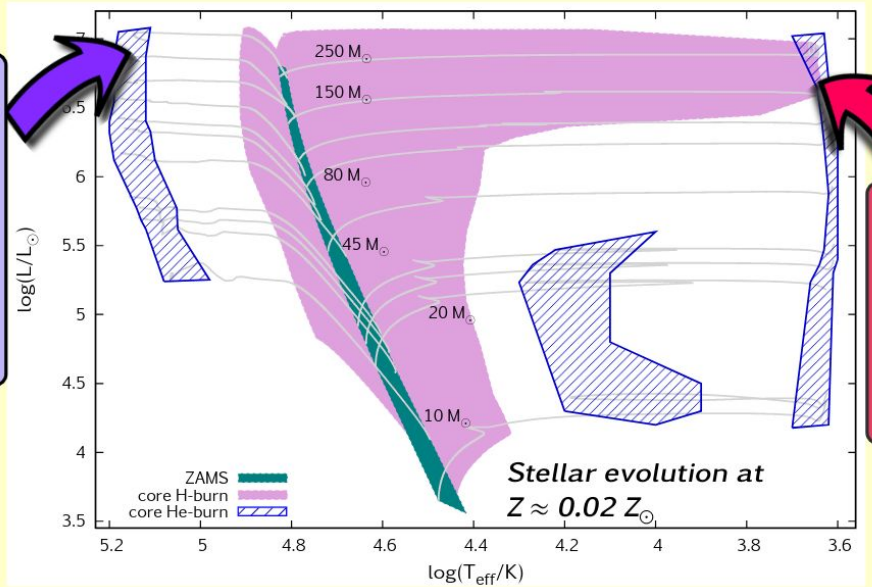
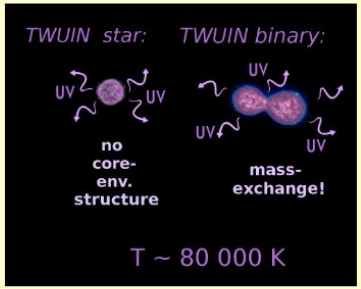
Szécsi et al. 2015:

Transparent Wind Ultraviolet INtense (TWUIN) stars
↓
dwarf galaxies

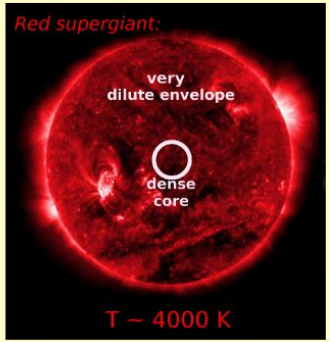


Cool, Luminous Supergiant stars
↓
globular clusters



Kubátová & Szécsi+19, Szécsi'17a,'17b

Szécsi+22, Garcia, . . . , Szécsi+21



Szécsi & Wünsch'19, Szécsi+18

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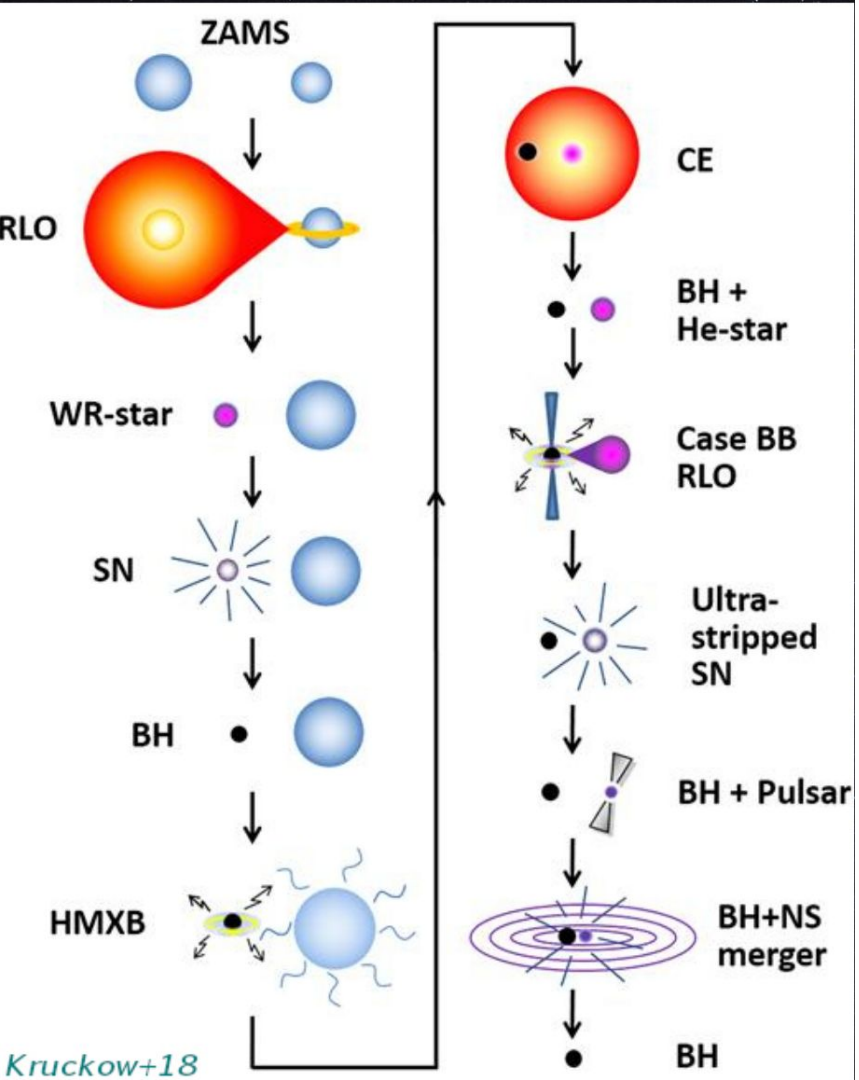
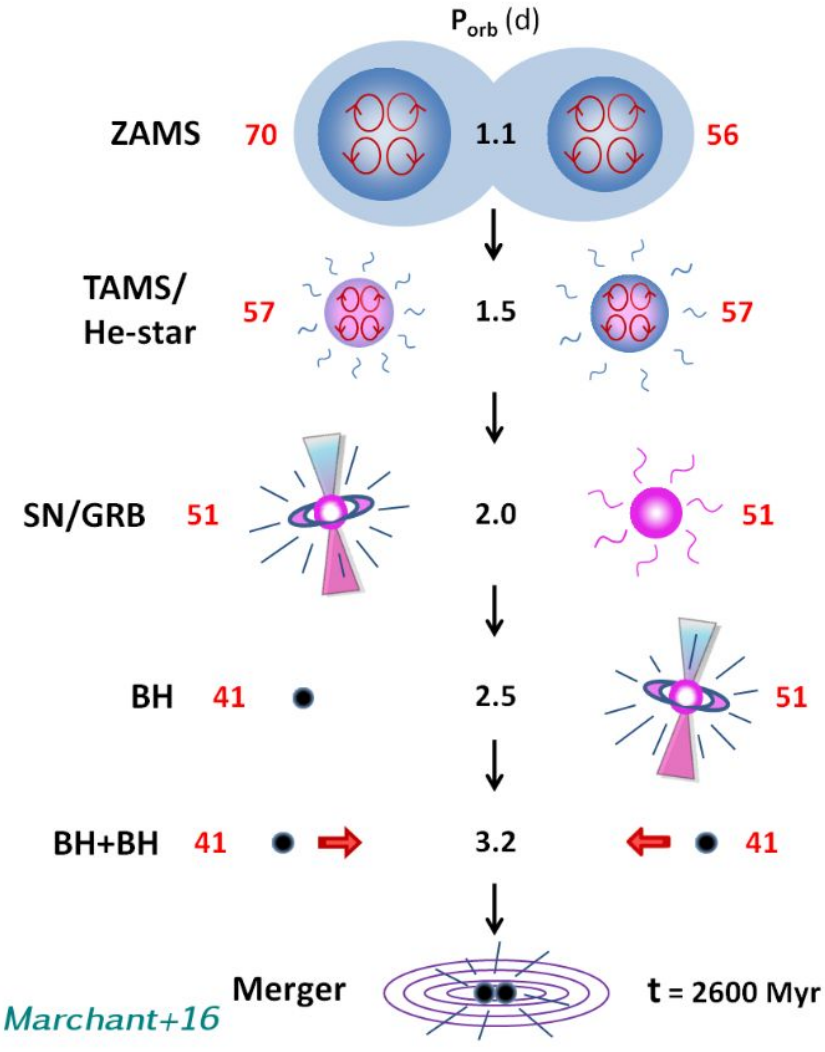
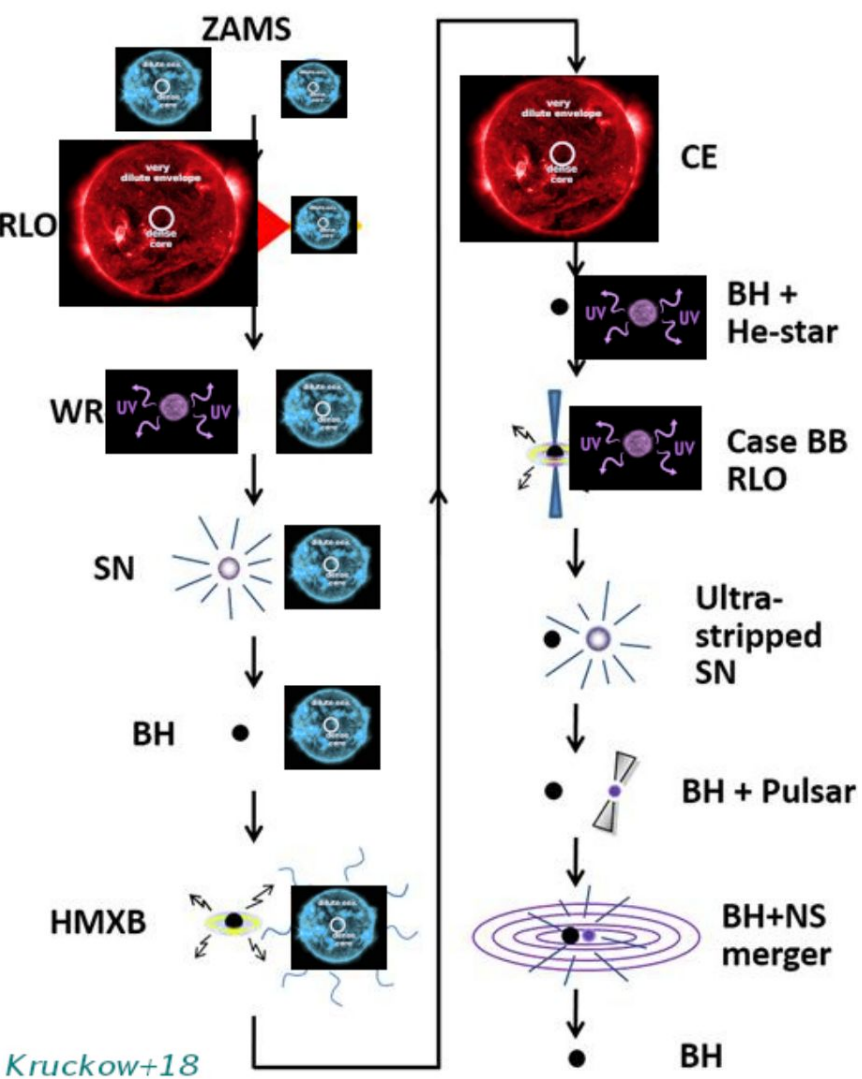
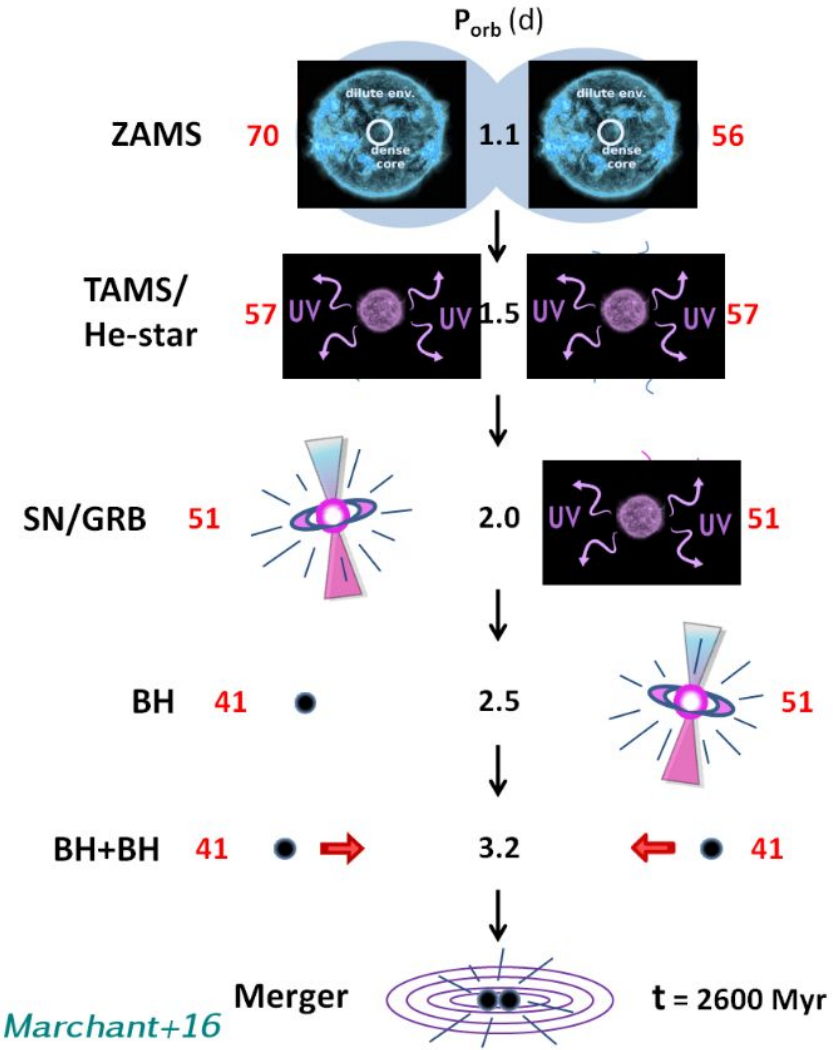

ZAMS
RLO
WR-star
SN
BH
HMXB
CE
BH +
He-star
Case BB
RLO
Ultra-
stripped
SN
BH + Pulsar
BH+NS
merger
BH
Kruckow+18


P orb (d)
ZAMS
70
1.1
56
TAMS/
He-star
57
1.5
57
SN/GRB
51
2.0
51
BH
41
2.5
51
BH+BH
41
3.2
41
Merger
t = 2600 Myr
Marchant+16


ZAMS
RLO
very dilute envelope
dense core
WR
UV
SN
BH
HMXB
CE
BH + He-star
Case BB RLO
Ultra-stripped SN
BH + Pulsar
BH+NS merger
BH
Kruckow+18


P_{orb} (d)
ZAMS
70
dilute env.
dense core
1.1
56
TAMS/ He-star
57
UV
1.5
57
SN/GRB
51
2.0
51
BH
41
2.5
51
BH+BH
41
3.2
41
Merger
t = 2600 Myr
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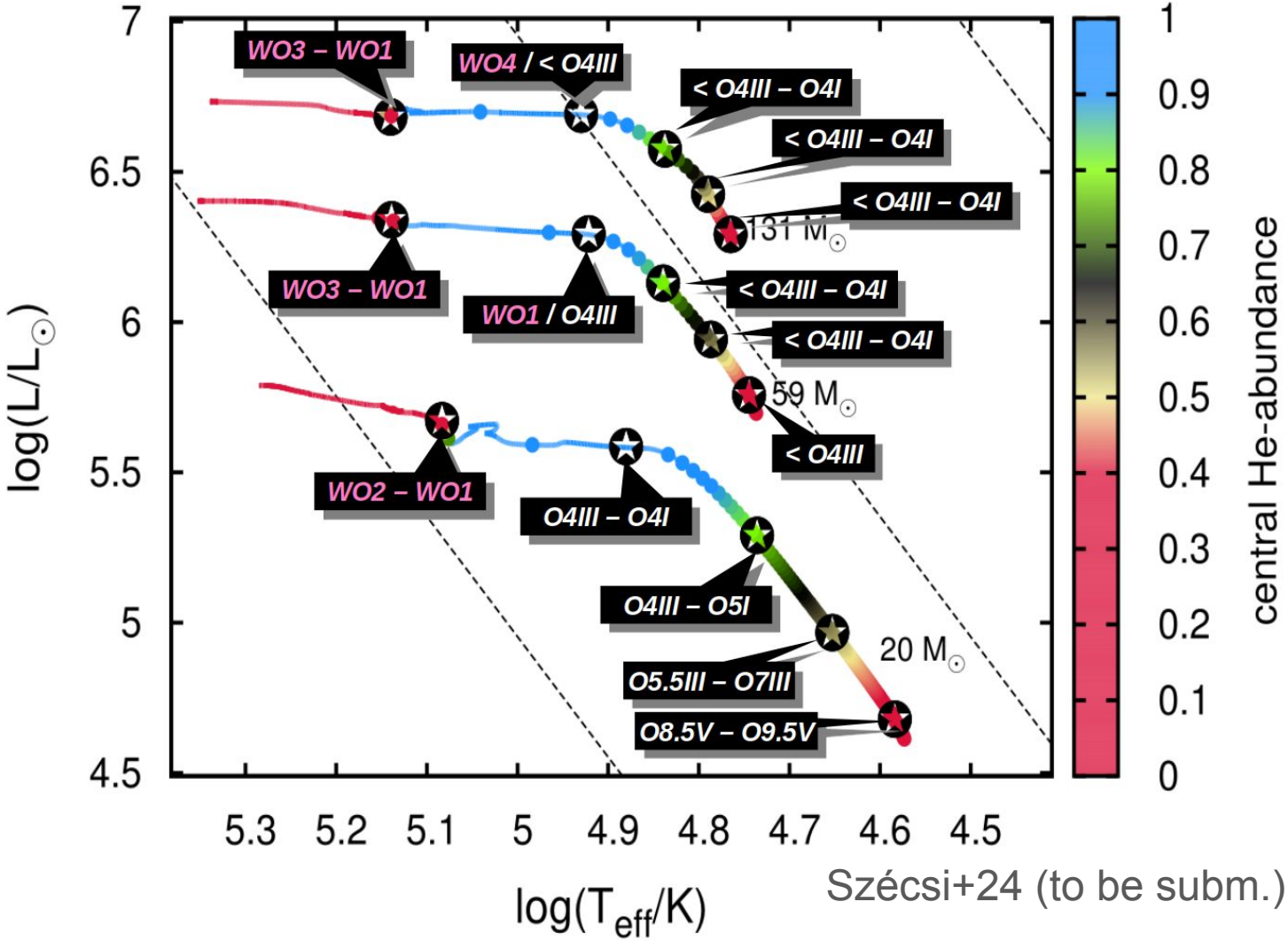

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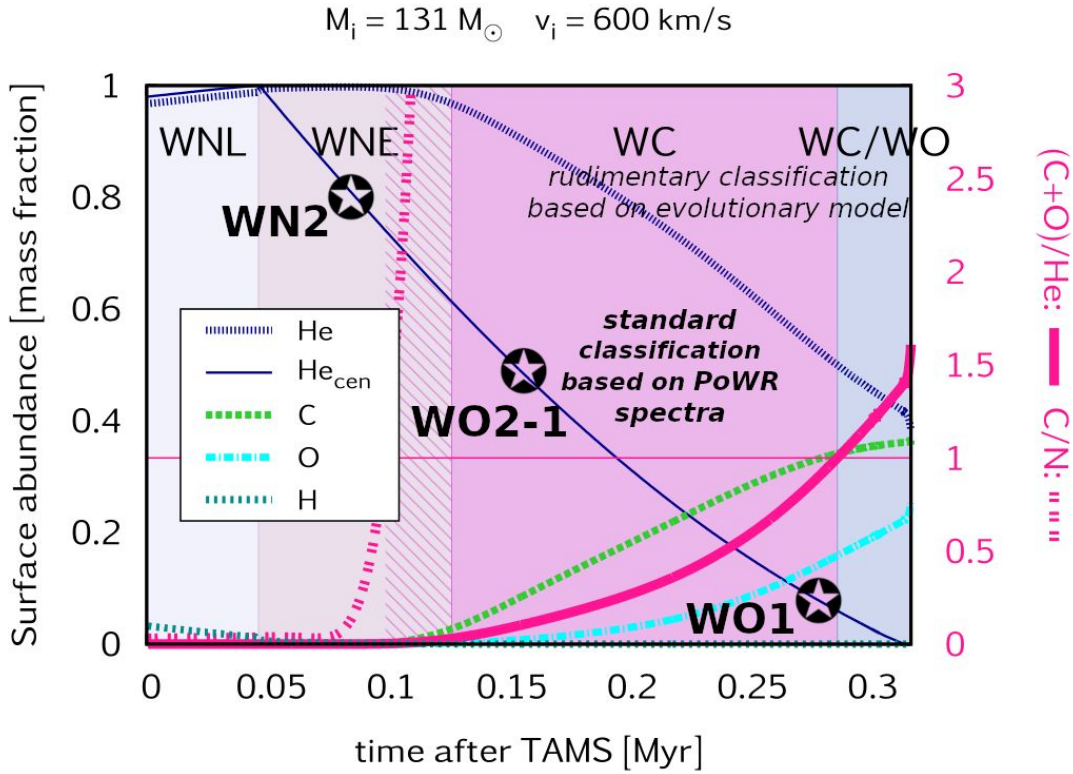
Szécsi+24 (to be subm.)

A new evolutionary sequence for massive CHE stars (*aka* potential GW-progenitors):

O → WN → WO

i.e. no WC!



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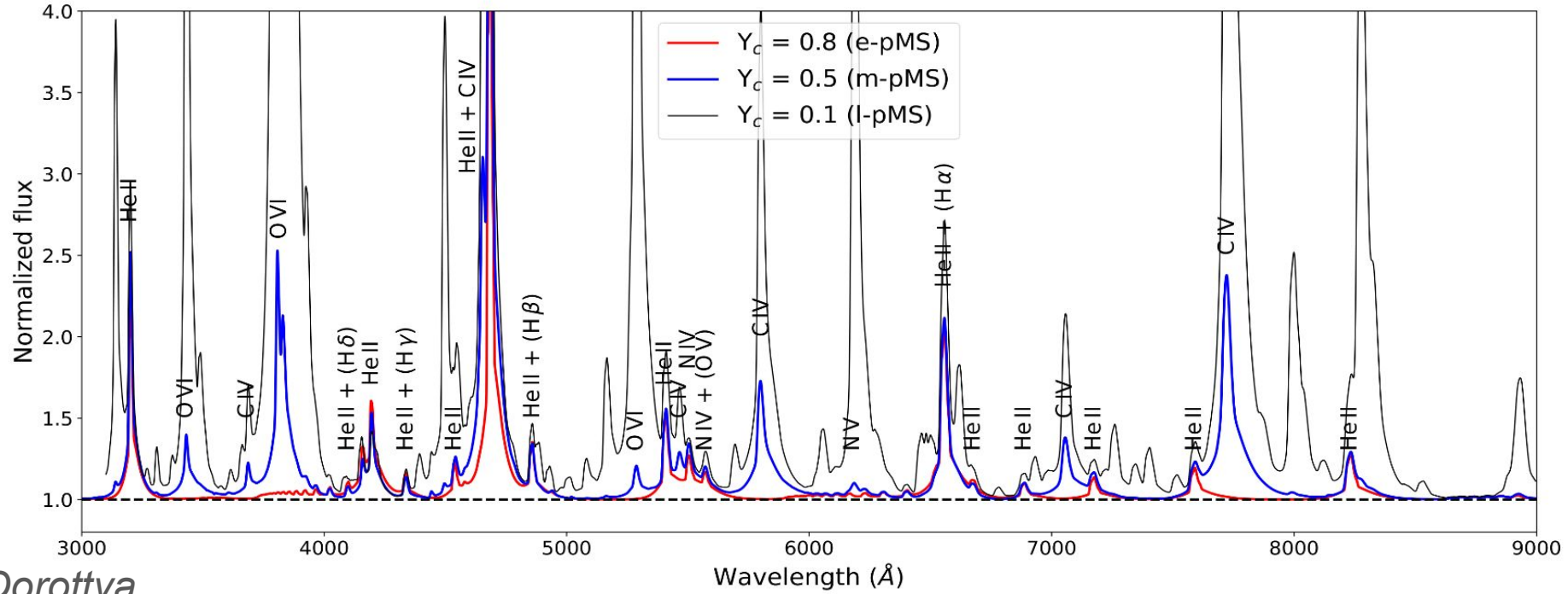
PoWR models *(credit: B.Kubátová)*



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WC features in dwarf galaxies are in fact WO features?

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He-II ionization in IZw18 (NW region)

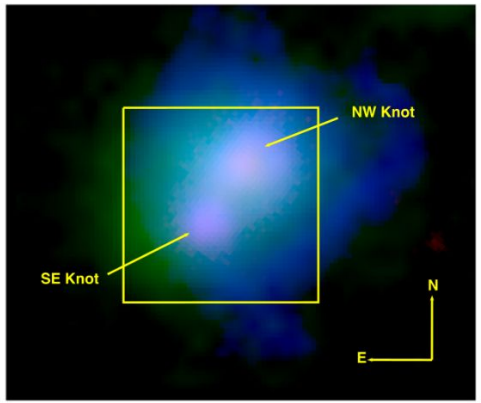
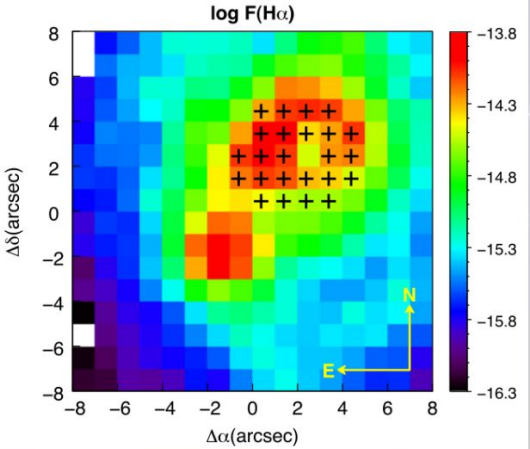


Figure 1. Color-composite image of IZw 18 (blue = Hα from Palomar, green = far-UV/*GALEX*, red = SDSS r'). The box represents the FOV (16"×16") of the PMAS spectrograph over the galaxy main body and the extended Hα halo. The PMAS FOV is centered on the coordinates R.A. (J2000.0) = $09^h:34^m:02\overset{s}{.}2$ and decl. (J2000.0) = $+55°:14':25''$.



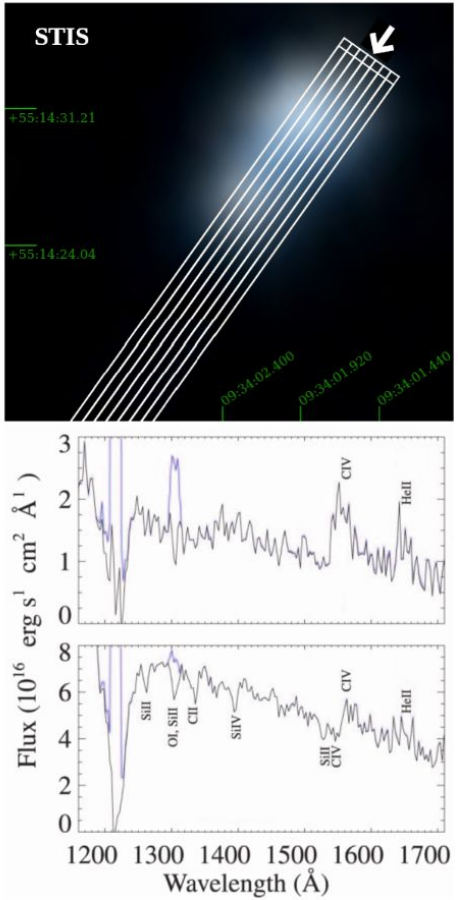


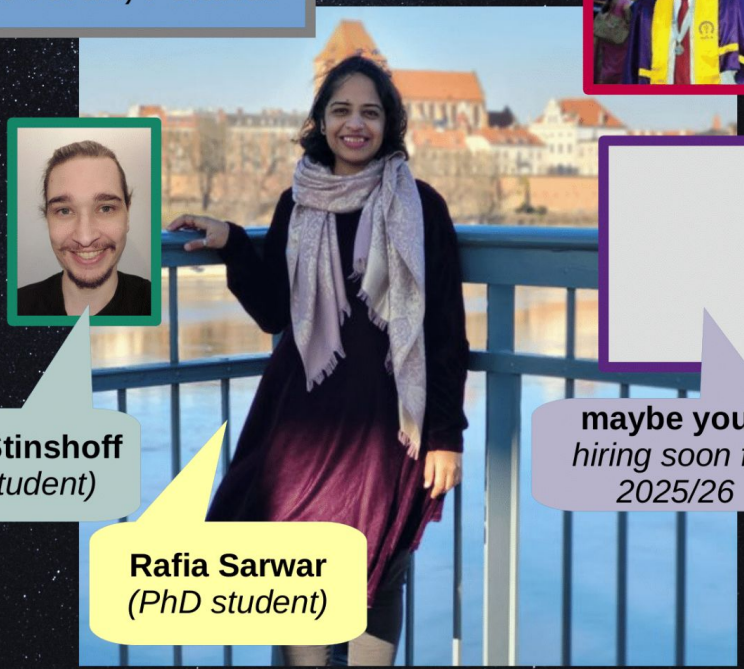
Fig. 9. UV spectra reproduced from Brown et al. (2002). Observations taken with Hubble's Space Telescope Imaging Spectrograph (STIS) using the G140L grating and the 52" × 0".5 slit. The two spectra (*bottom*) are taken from two clusters in the North Western region which contain C IV bumps (*top*, the slit in question is pointed at by the white arrow). Note the presence of similar-sized He II bumps too.

My people :D

Dr Poojan Agrawal
(post-doc at Chapel Hill, NC)

Agrawal & Szécsi et al. (2022, MNRAS)

In Toruń, Poland:



Hanno Stinshoff
(PhD student)

Rafia Sarwar
(PhD student)

Dr. Koushik Sen
(post-doc)

maybe you?
hiring soon for 2025/26

Thanks!

Dorottya Szécsi