Internal dynamics of Multiple Populations in type II Globular Clusters

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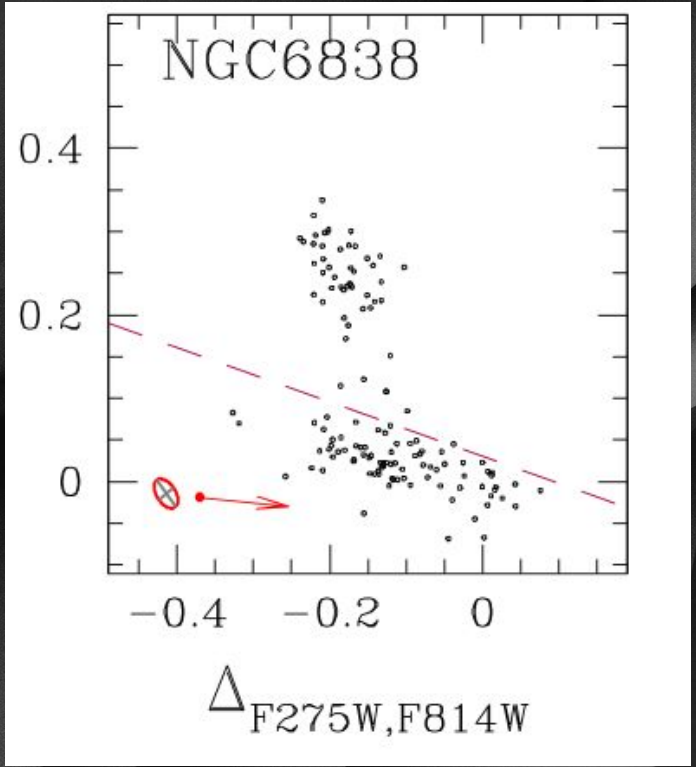
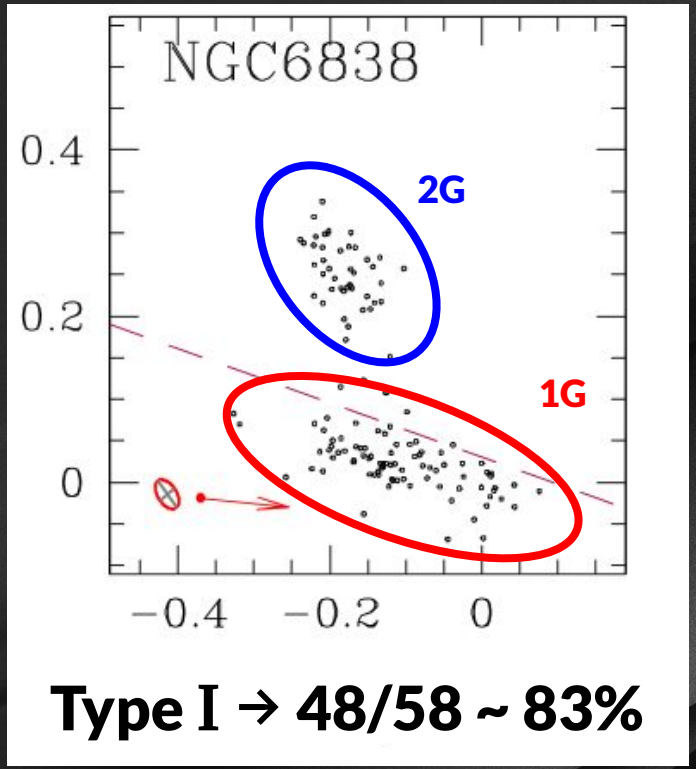
Type I Globular Clusters



Milone et al. 2017

Type I Globular Clusters

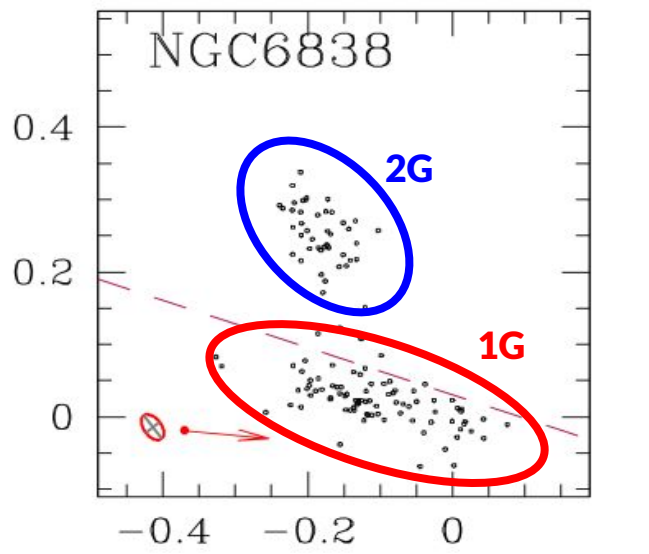


Type I → 48/58 ~ 83%

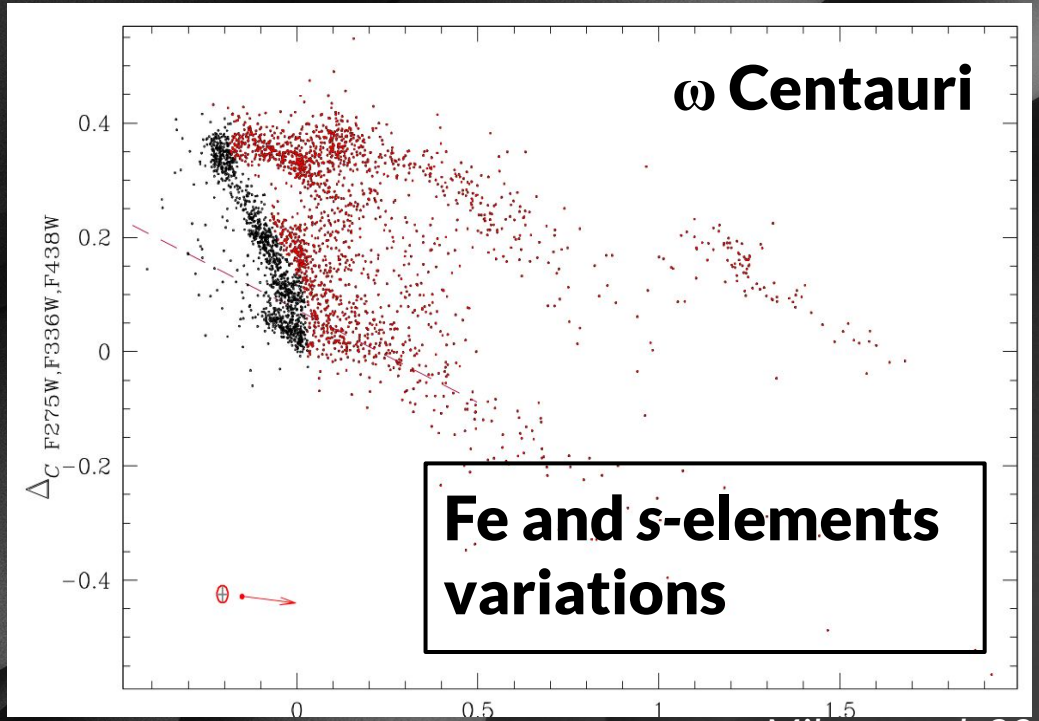
Cordoni et al. 2020a, ApJ, 889, 18

→ Internal dynamics of 7 type I Globular Clusters

Type II Globular Clusters

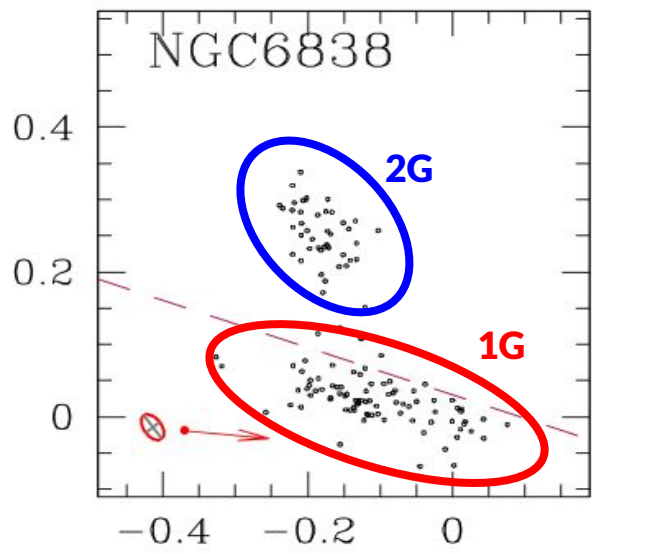


Type I → 48/58 ~ 83%

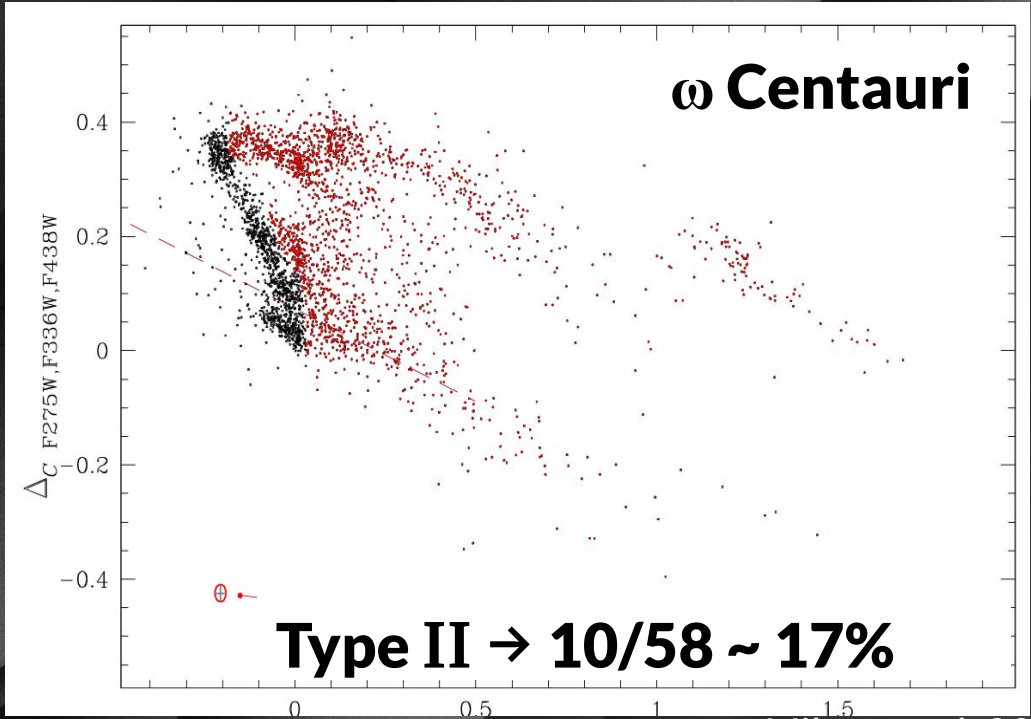


Milone et al. 2017

Type II Globular Clusters



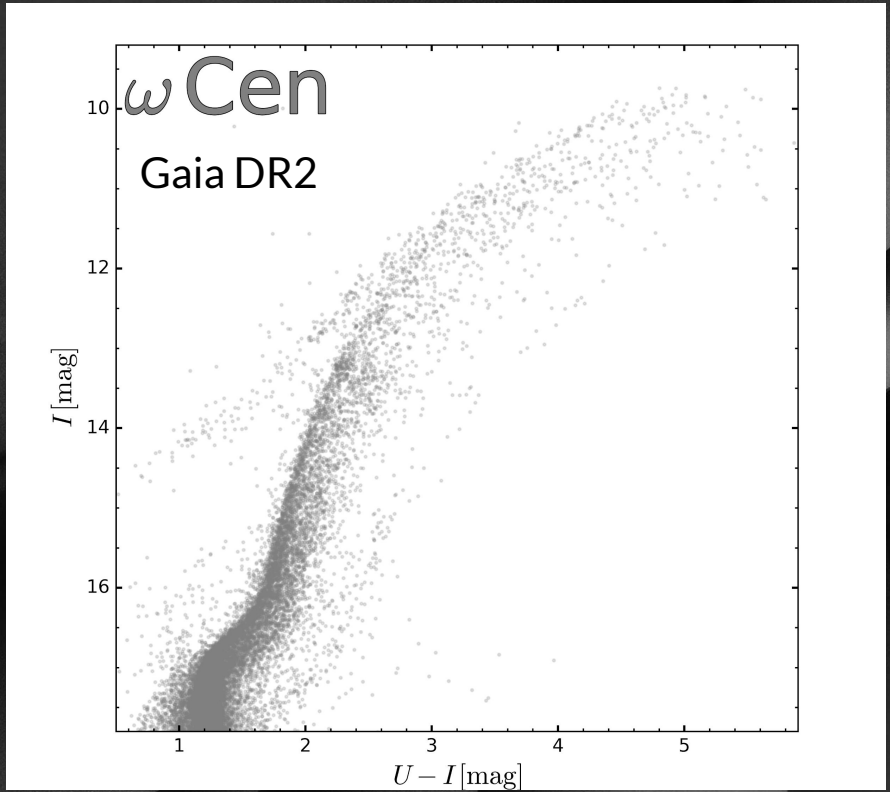
Type I → 48/58 ~ 83%



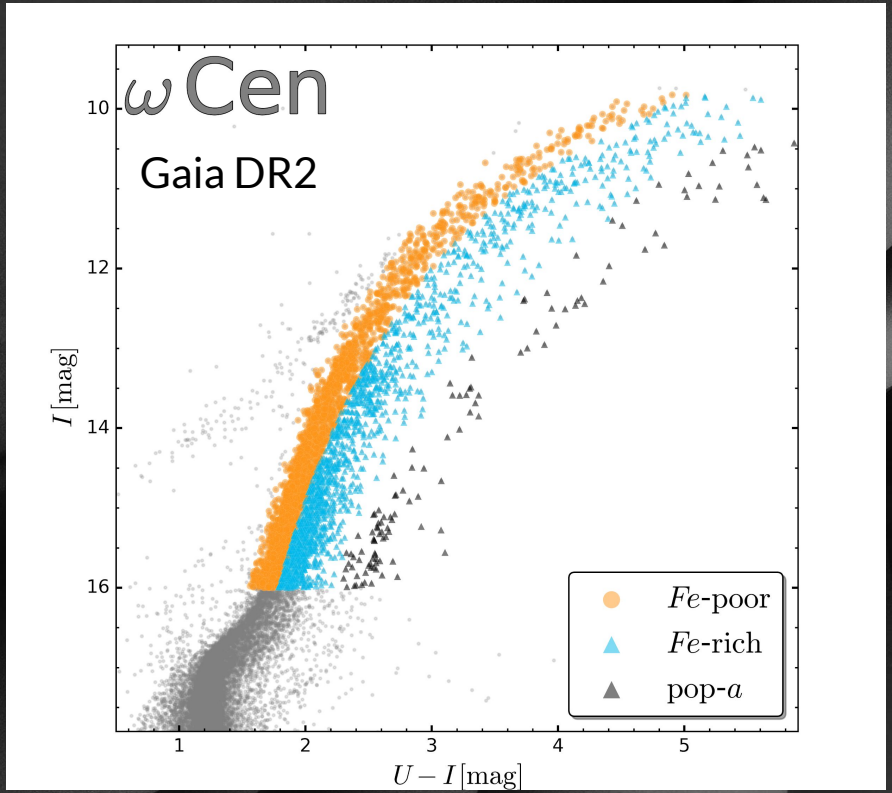
Type II → 10/58 ~ 17%

Milone et al. 2017

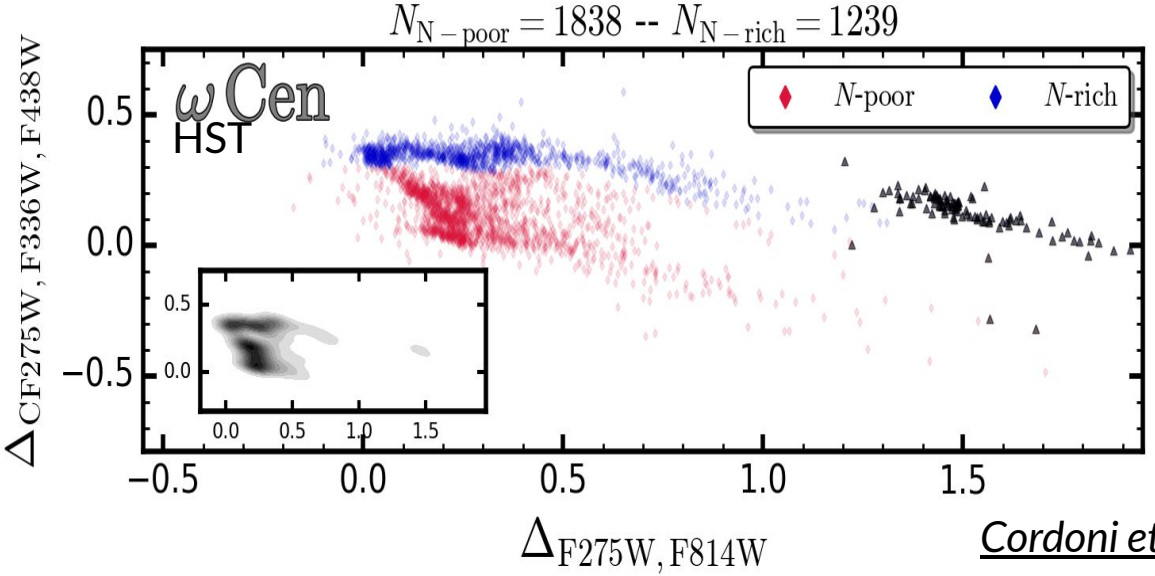
The case of ωCentauri



Multiple Populations: *Iron*

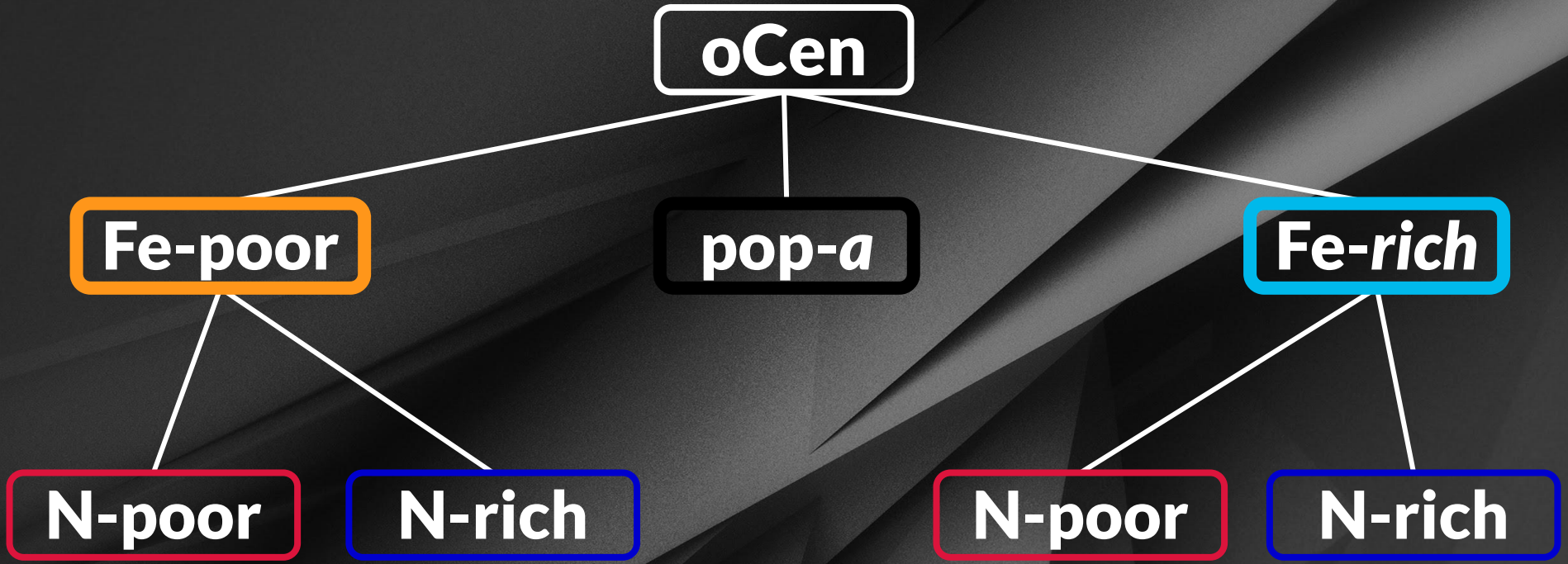


Multiple Populations: *Nitrogen*



Cordoni et al. 2020b

Populations summary



Analysis

HST data
photometry and proper motions from 0 to ~0.5 R_h

⊕

GAIA astrometry
proper motions from ~1 to ~4 R_h

⊕

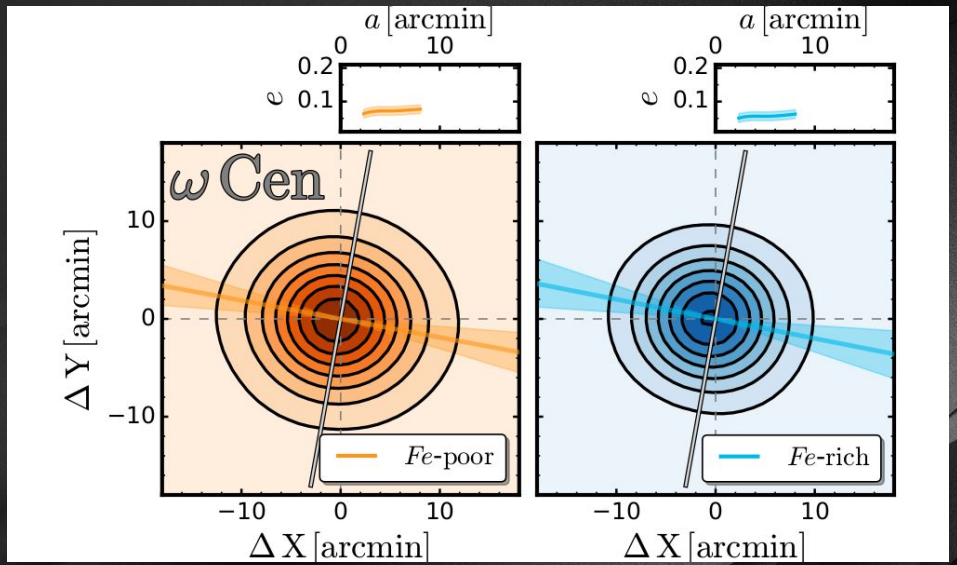
SUMO photometry
Ground-based photometry from ~0 to ~4 R_h

→ *Morphology*
- Ellipticity profile
- Semi-major axis

→ *Internal dynamics*
- Rotation
- Radial/tangential ν profile
- Dispersion profile
- Anisotropy

Results

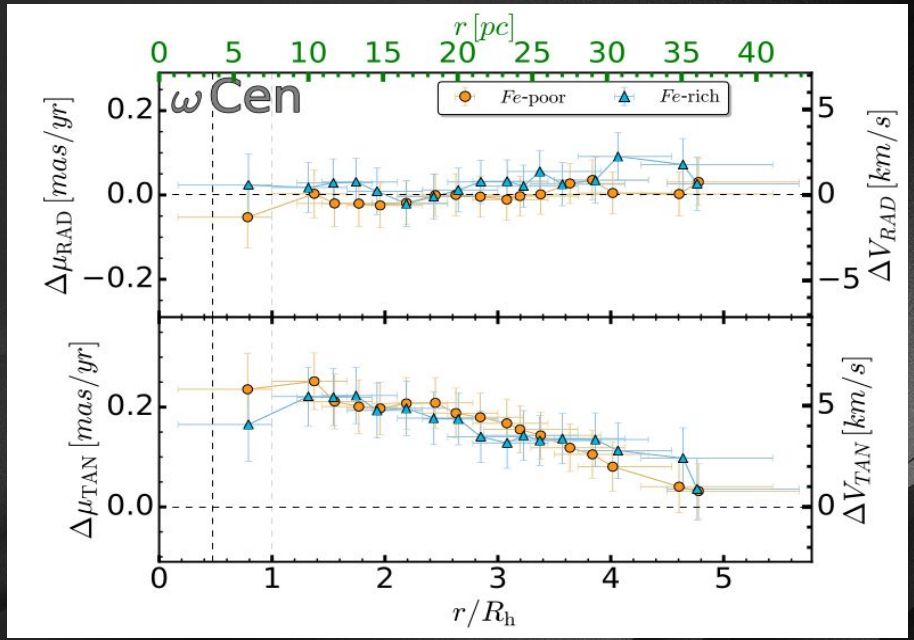
Morphology of populations with different Fe



→ ***Similar*** **morphology**

Results

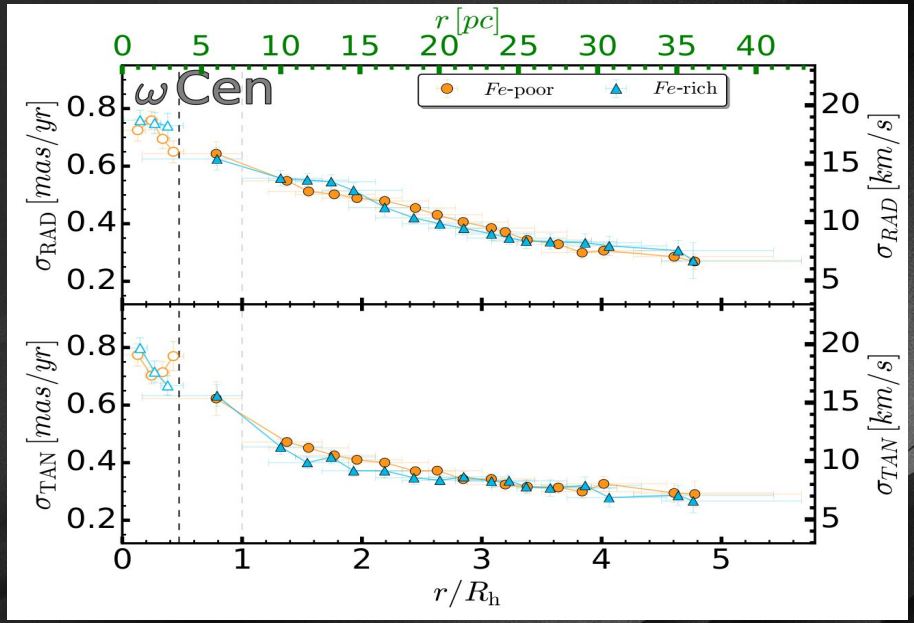
Internal dynamics of populations with different Fe



- → ***Similar*** **morphology**
- → ***Similar*** **velocity profiles**

Results

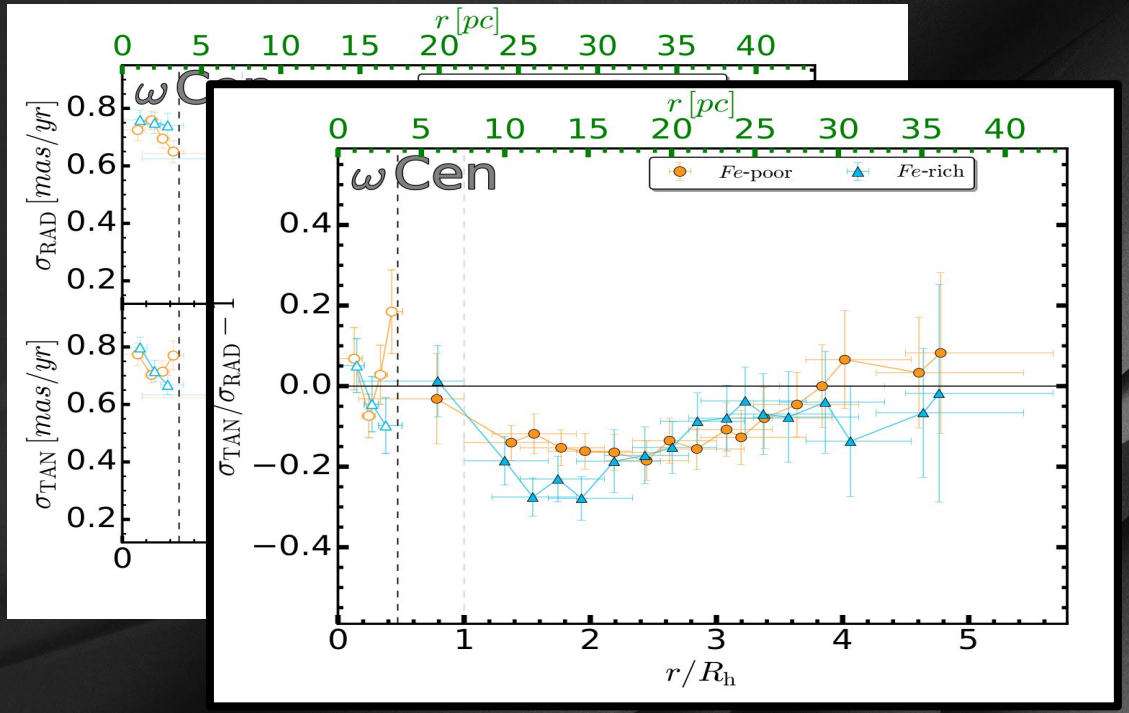
Internal dynamics of populations with different Fe



- → ***Similar*** **morphology**
- → ***Similar*** **velocity profiles**
- → ***Similar*** **dispersion and anisotropy profiles**

Results

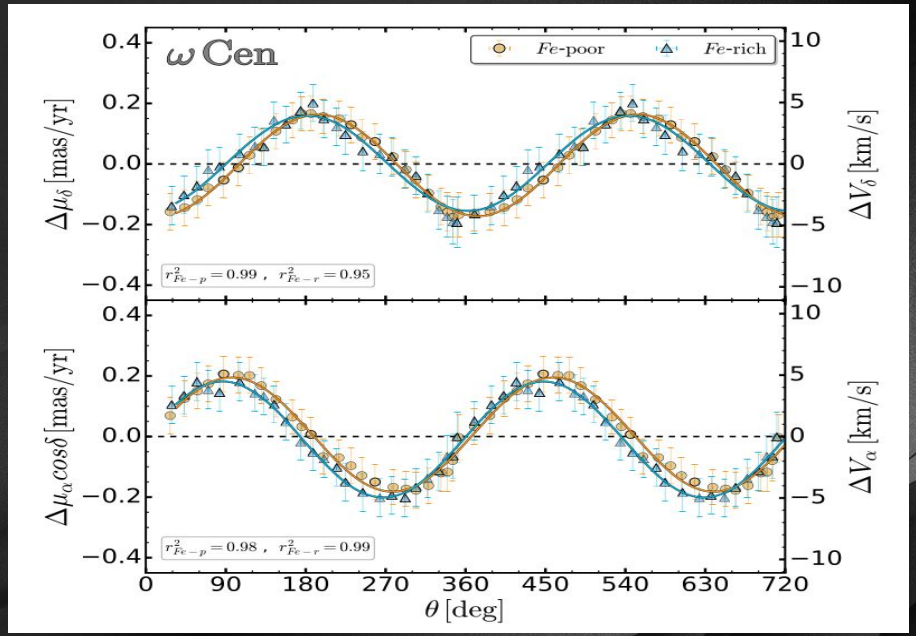
Internal dynamics of populations with different Fe



- → *Similar* morphology
- → *Similar* velocity profiles
- → *Similar* dispersion and anisotropy profiles

Results

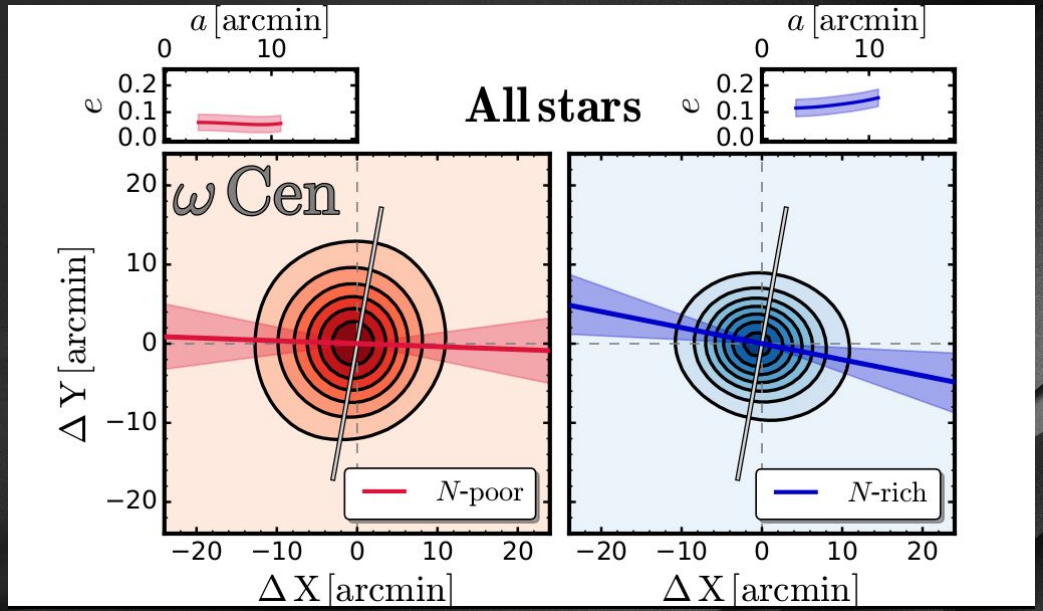
Internal dynamics of populations with different Fe



- → *Similar* morphology
- → *Similar* velocity profile
- → *Similar* dispersion and anisotropy profile
- → *Similar* rotation

Results

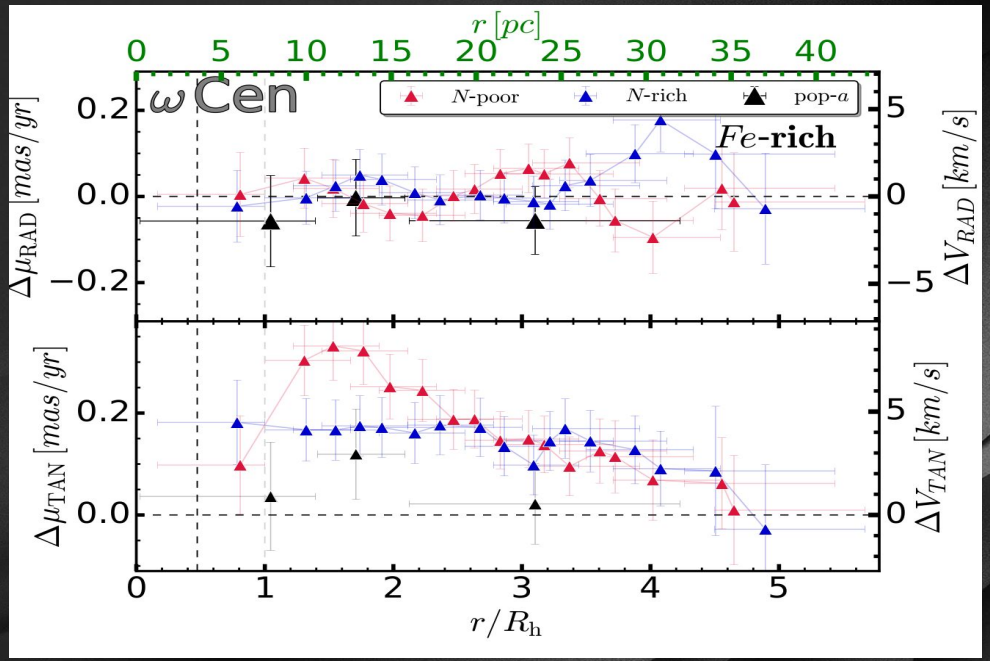
Morphology of populations with different N



➔ *Different* morphology

Results

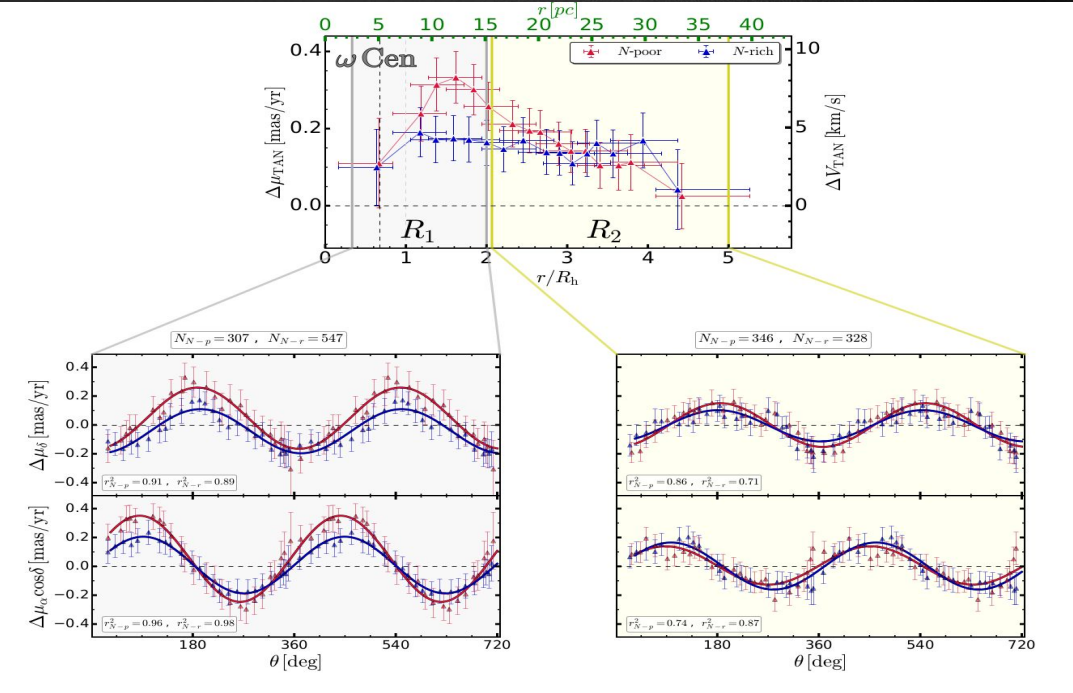
Internal dynamics of populations with different N



→ *Different* morphology

→ *Different velocity profiles and rotation*

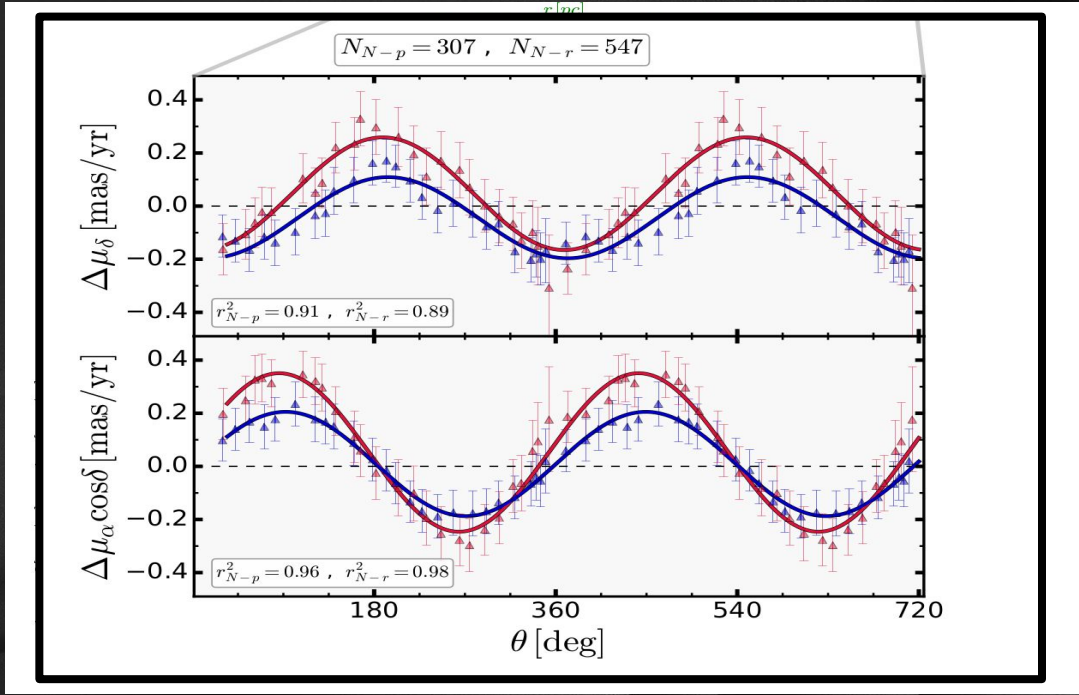
Results: different N



- → *Different* morphology
- → *Different velocity profiles and rotation*

Results

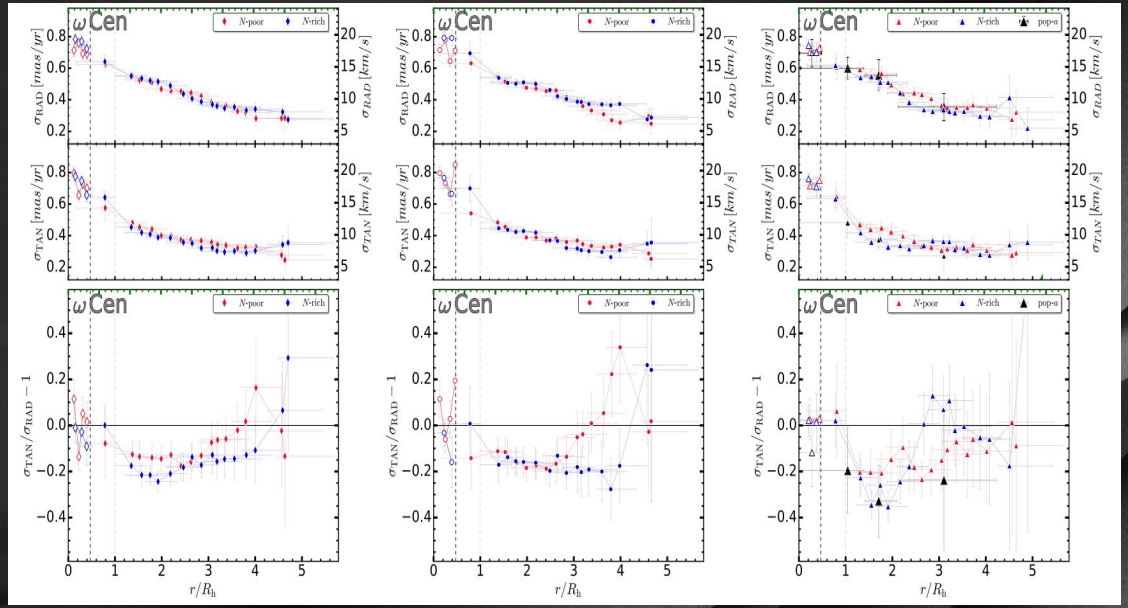
Internal dynamics of populations with different N



- → *Different* morphology
- → *Different velocity profiles and rotation*

Results

Internal dynamics of populations with different N



- → *Different* morphology
- → *Different velocity profiles and rotation*
- → *Similar* dispersion and anisotropy profiles

Conclusions

ωCentauri

- → **Different Fe** → **Same morphology/dynamics**
- → **Different N** → **Different morphology/dynamics**
- → **Puzzling pop-*a***

Conclusions

ωCentauri

- → **Different Fe** → Same morphology/dynamics
- → **Different N** → Different morphology/dynamics
- → Puzzling **pop-*a***

M22

Conclusions

ωCentauri

- → **Different Fe** → Same morphology/dynamics
- → **Different N** → Different morphology/dynamics
- → Puzzling **pop-*a***

M22

NO SPOILER !!

Cordoni et al. 2020b, ApJ, 898, 147

Conclusions

ωCentauri

- → Different Fe → Same morphology/dynamics
- → Different N → Different morphology/dynamics
- → Puzzling pop-*a*

More Info

- Cordoni et al. 2020a, ApJ, 889, 18
- Cordoni et al. 2020b, ApJ, 898, 147

- www.giacomocordoni.me
- http://progetti.dfa.unipd.it/GALFOR

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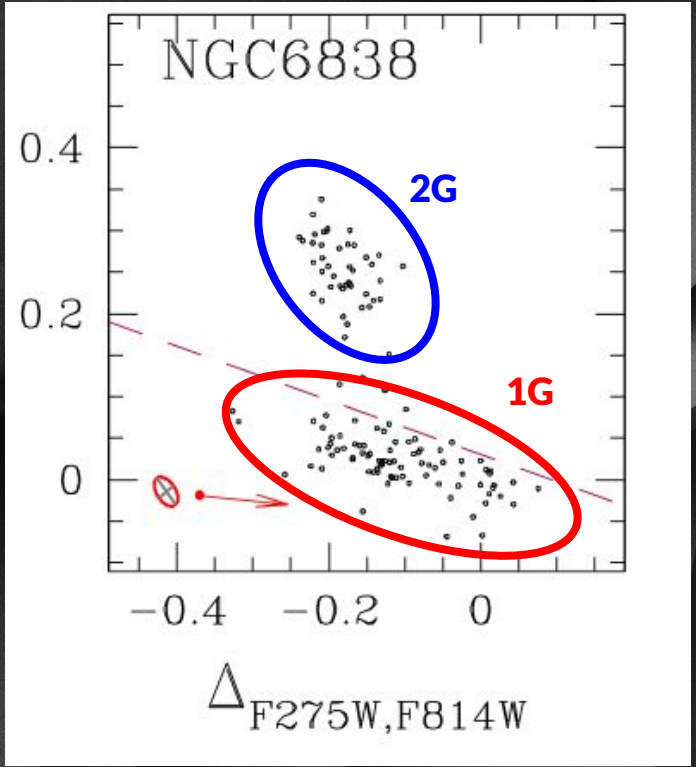

Milone et al. 2017

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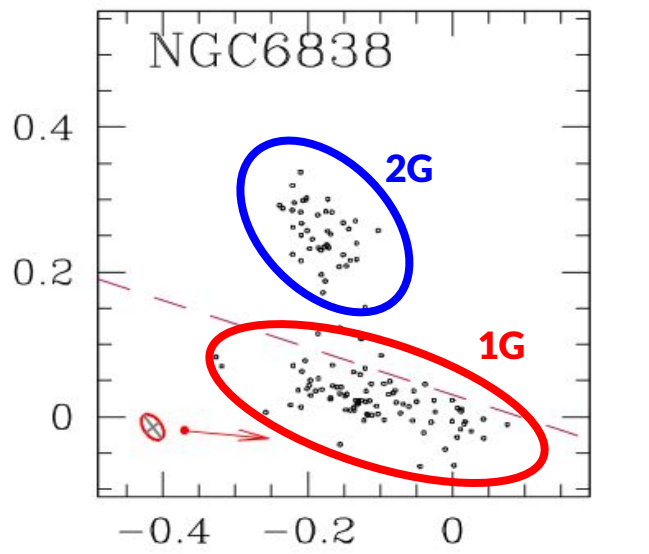

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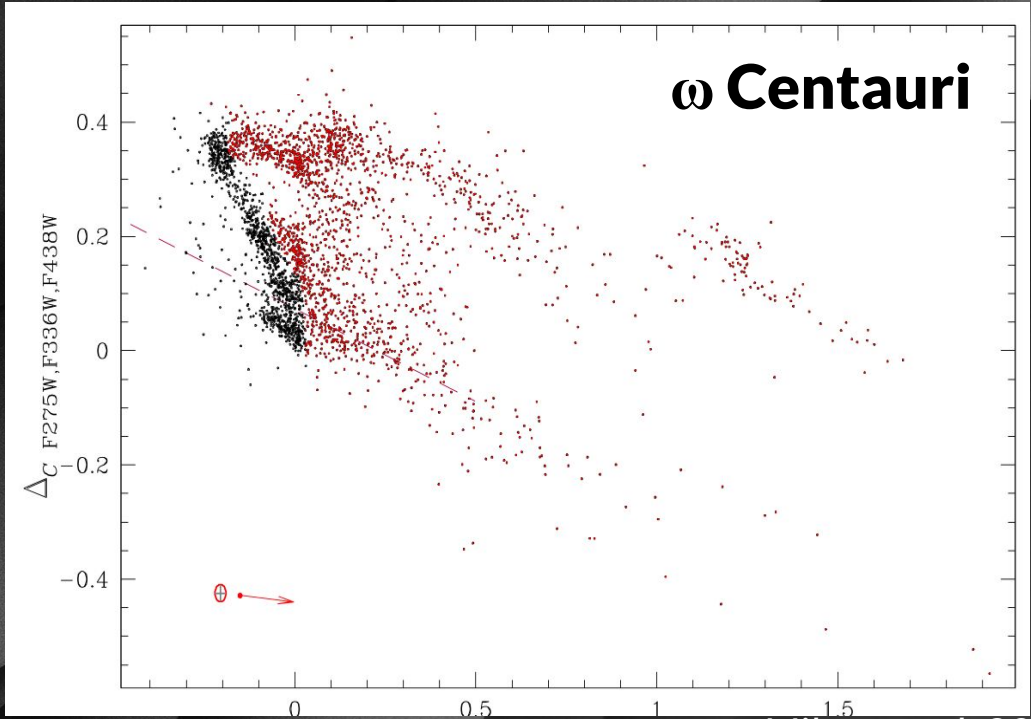
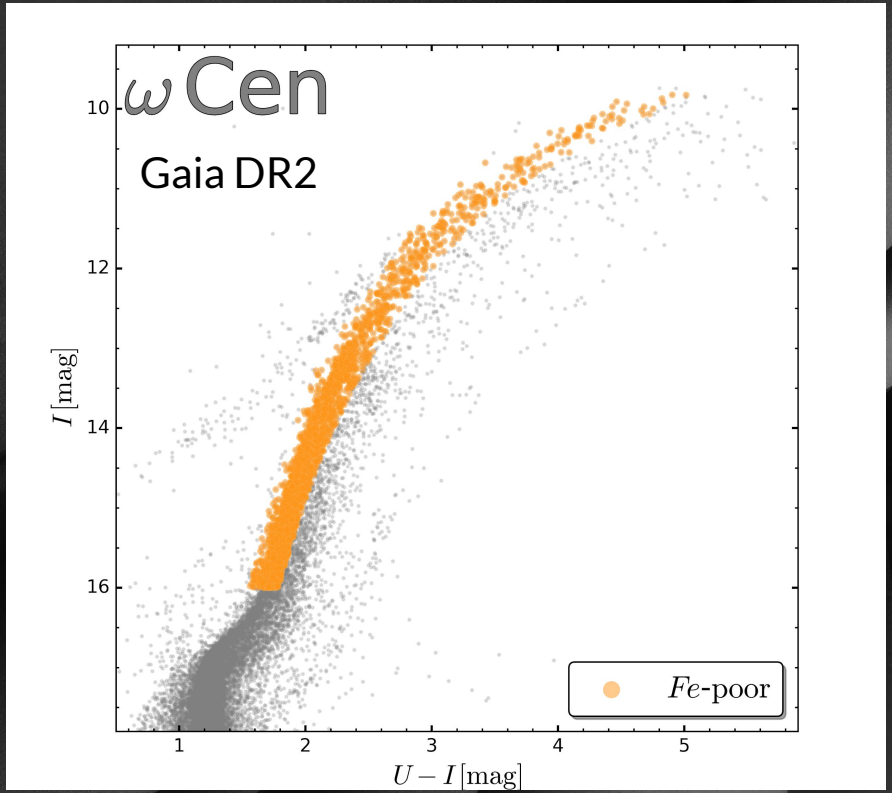
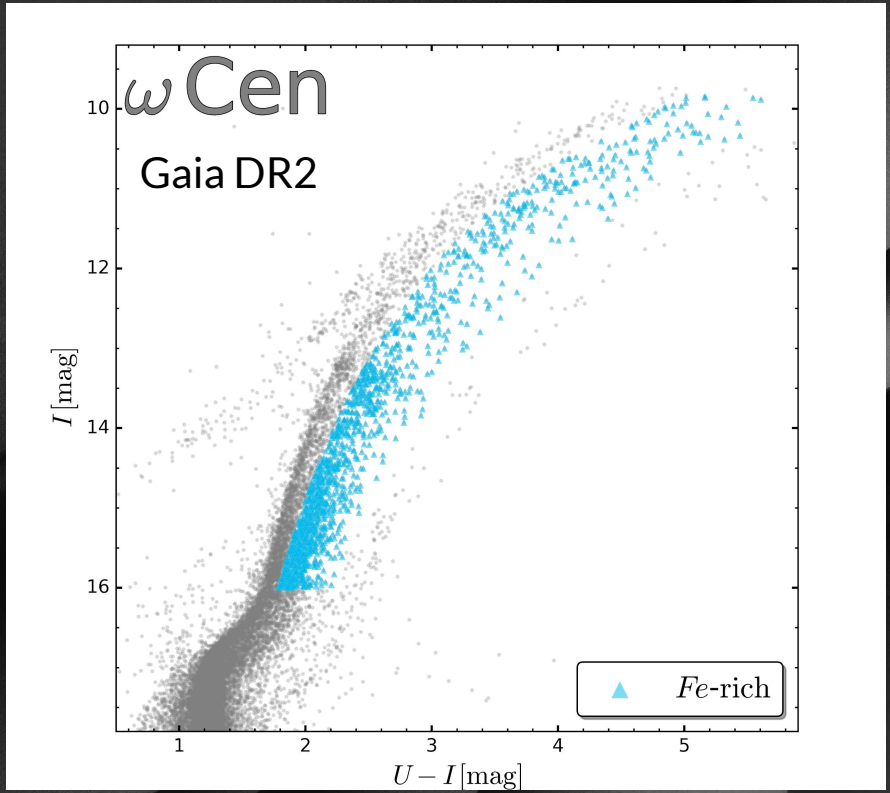


Milone et al. 2017

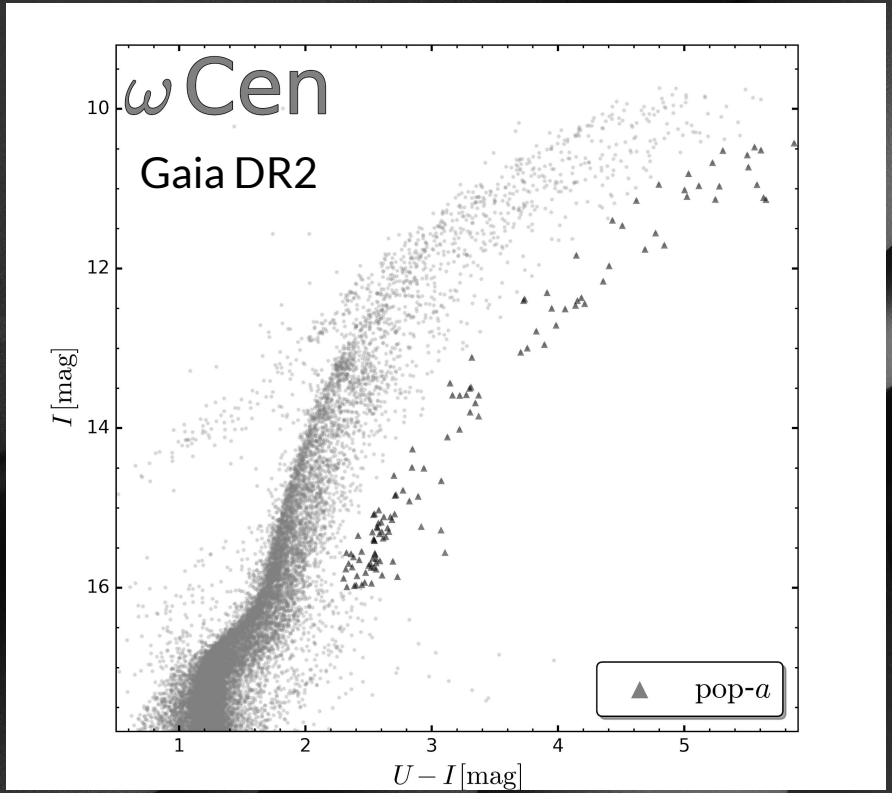
The case of ωCentauri



The case of ωCentauri



The case of ωCentauri



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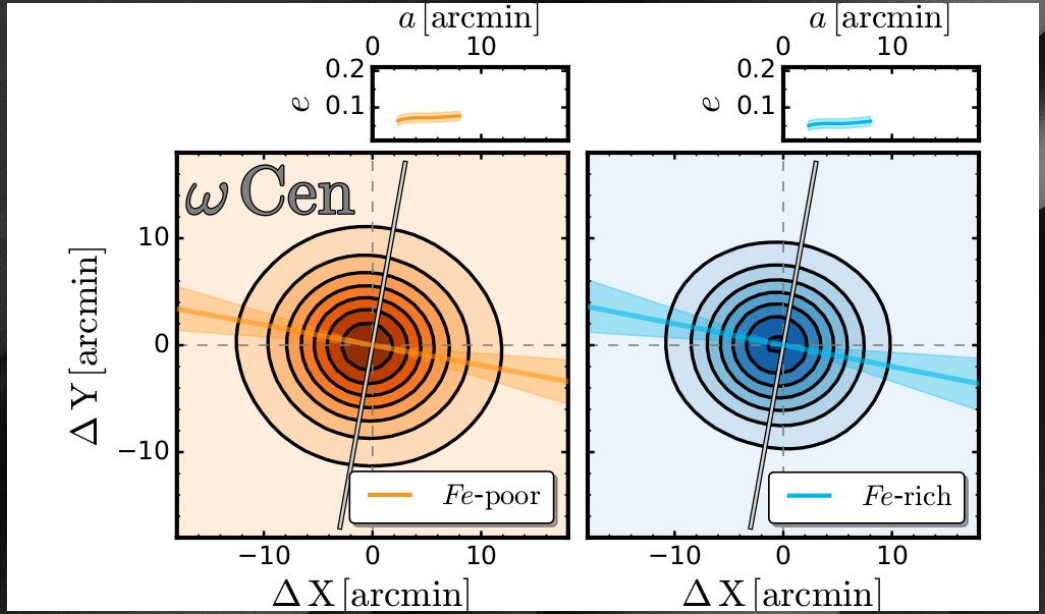
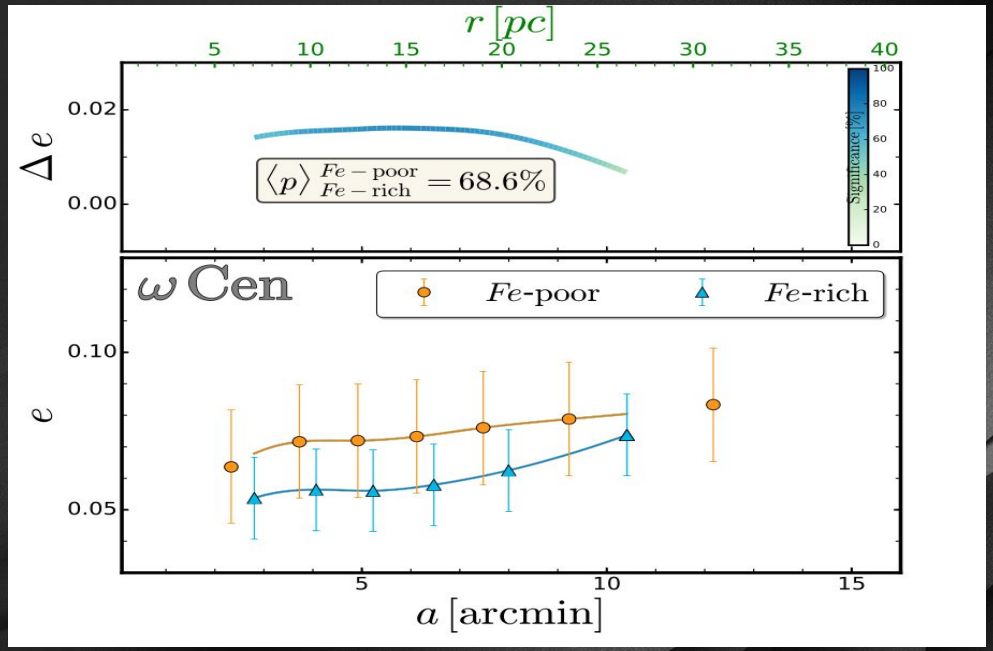
Morphology of populations with different Fe



Results

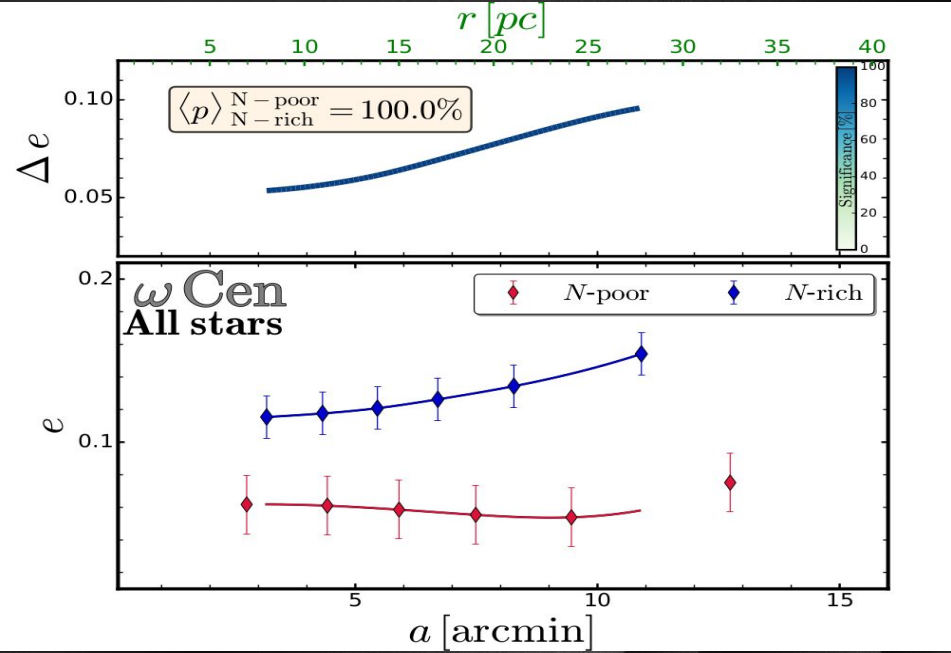
Internal dynamics of populations with different Fe



➔ ***Similar*** **morphology (within uncertainties)**

Results

Internal dynamics of populations with different N



➔ *Different* morphology