The physics of groups and galaxy properties therein, 12th December 2016, Paris

Radial metal abundance profiles in the hot intra-group and intra-cluster medium

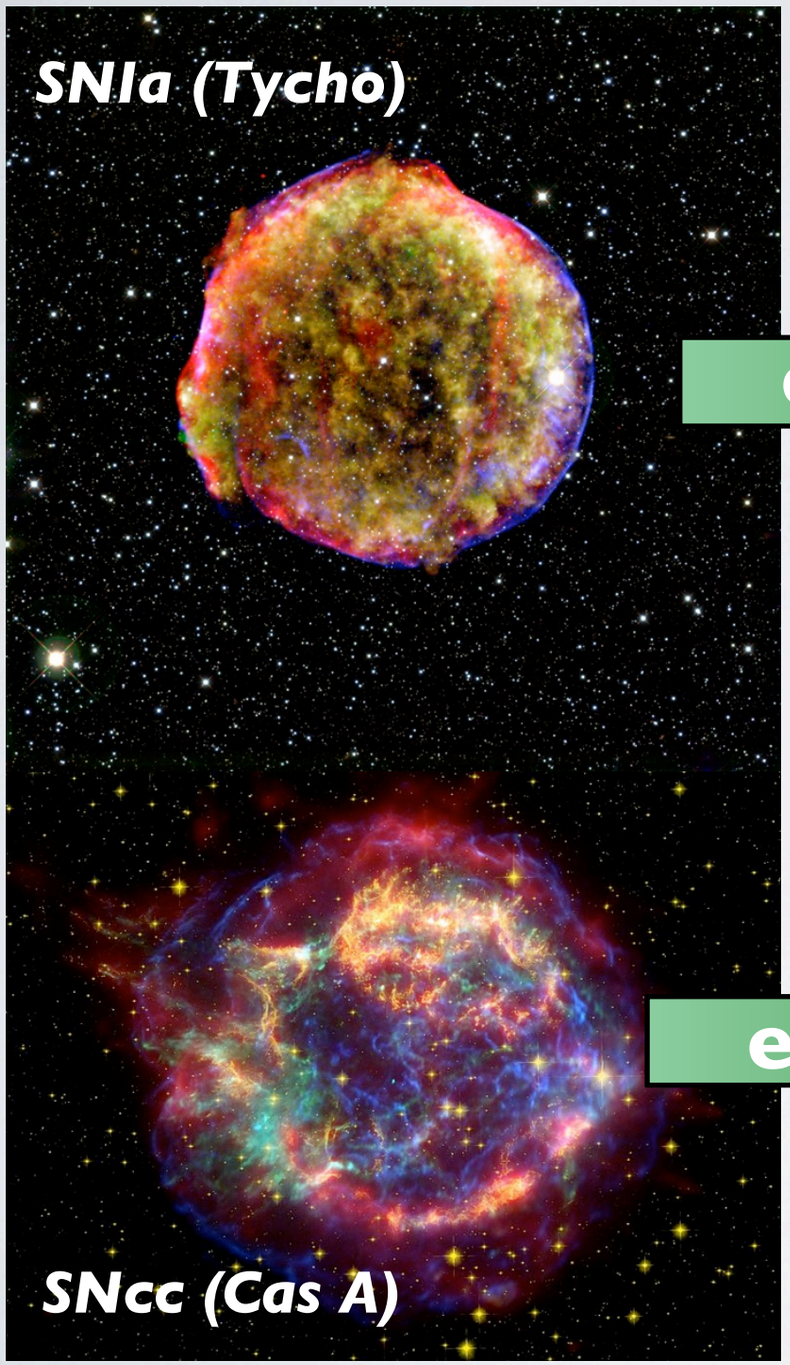
François Mernier

J. de Plaa, J. S. Kaastra, Y.-Y. Zhang, H. Akamatsu, L. Gu, P. Kosec, J. Mao, C. Pinto, T. H. Reiprich, J. S. Sanders, and the CHEERS collaboration

Sterrewacht Leiden

SRON Netherlands Institute for Space Research

Context & Motivation



(+ AGBs)

enriches

Si S Ar

Ca Fe Ni

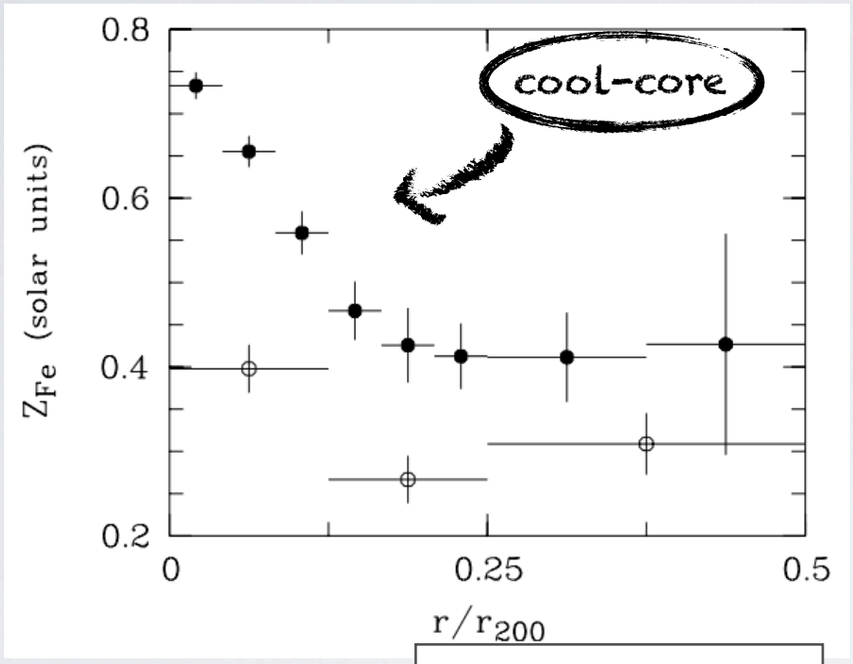
enriches

O Ne

Mg Si

Context & Motivation

1) SNIa products (Fe,...)



De Grandi et al. (2004)

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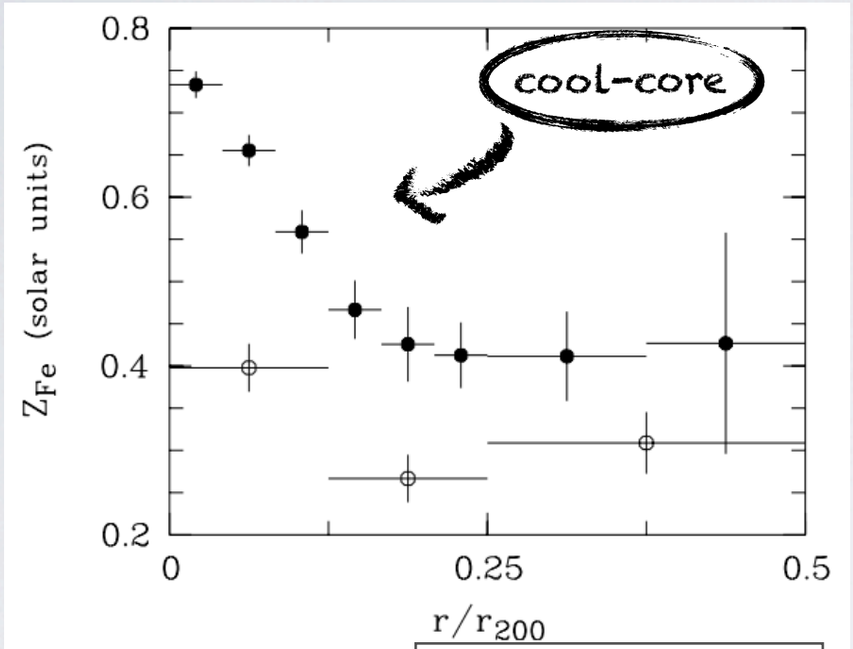

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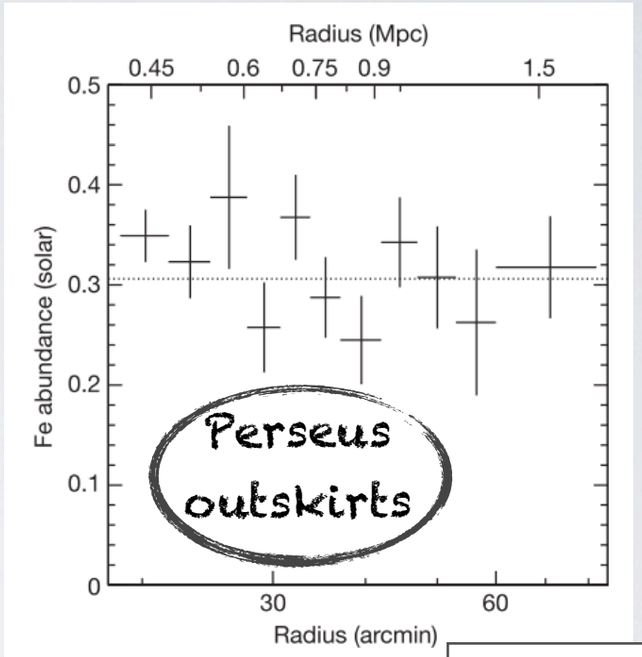

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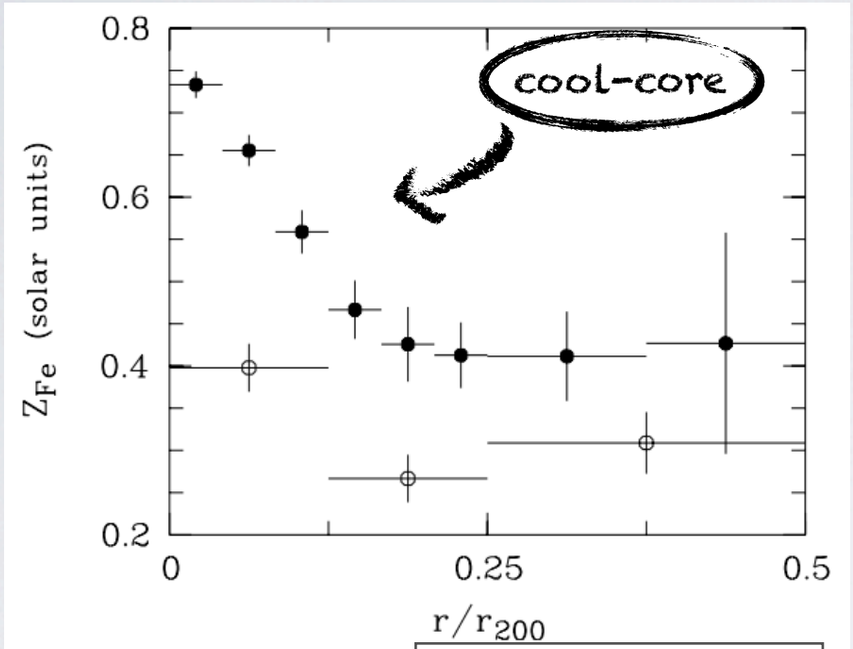

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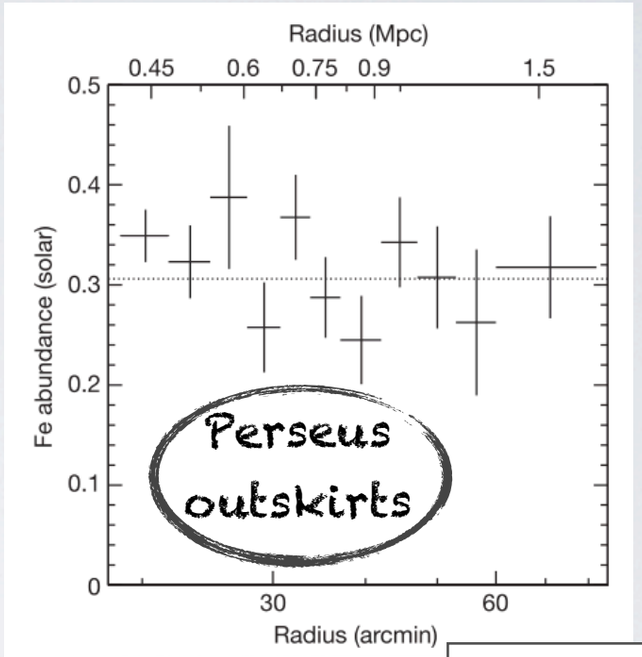

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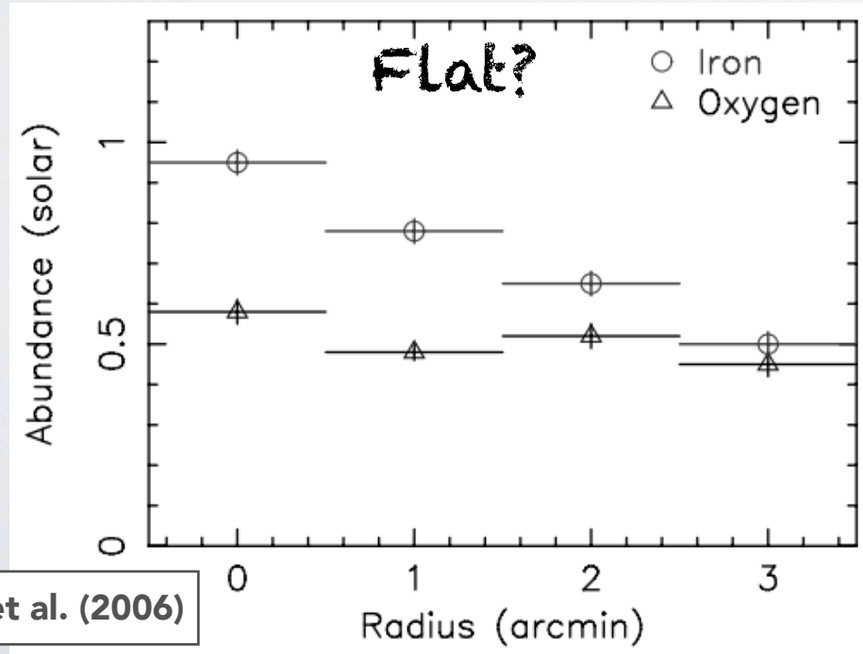

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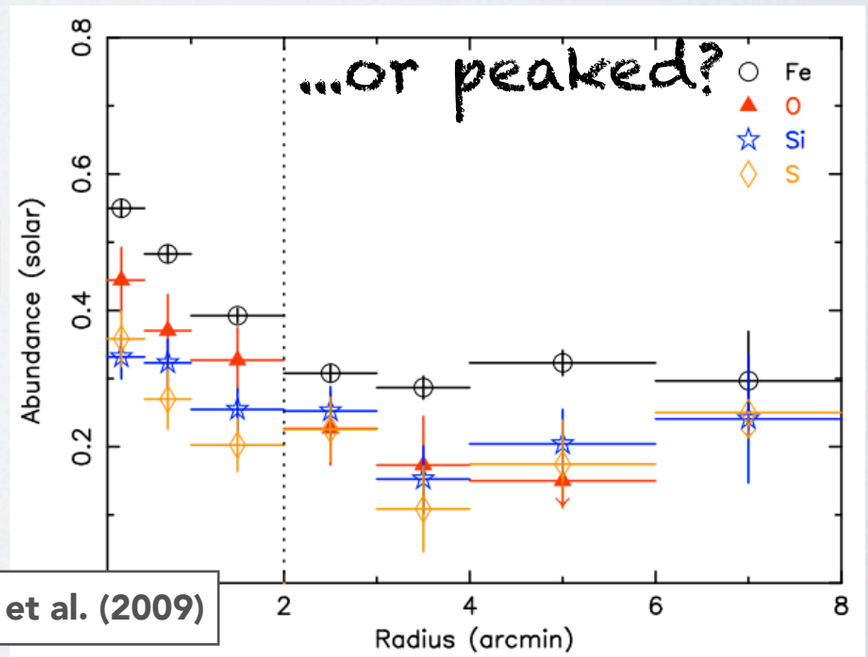

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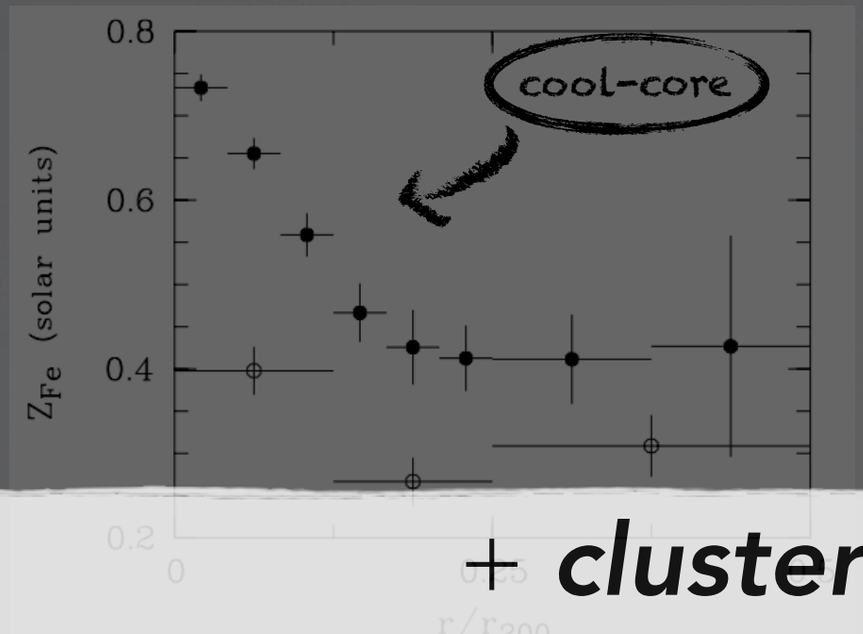

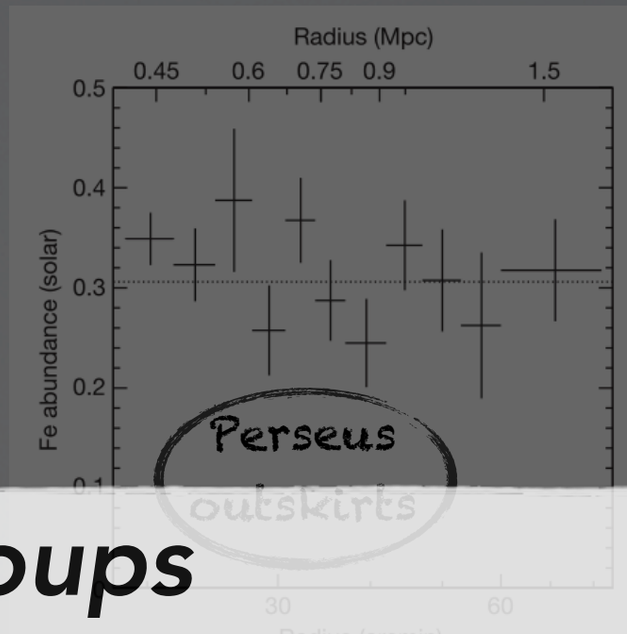

+ ***clusters*** vs. ***groups***

➔ different enrichment histories/processes?

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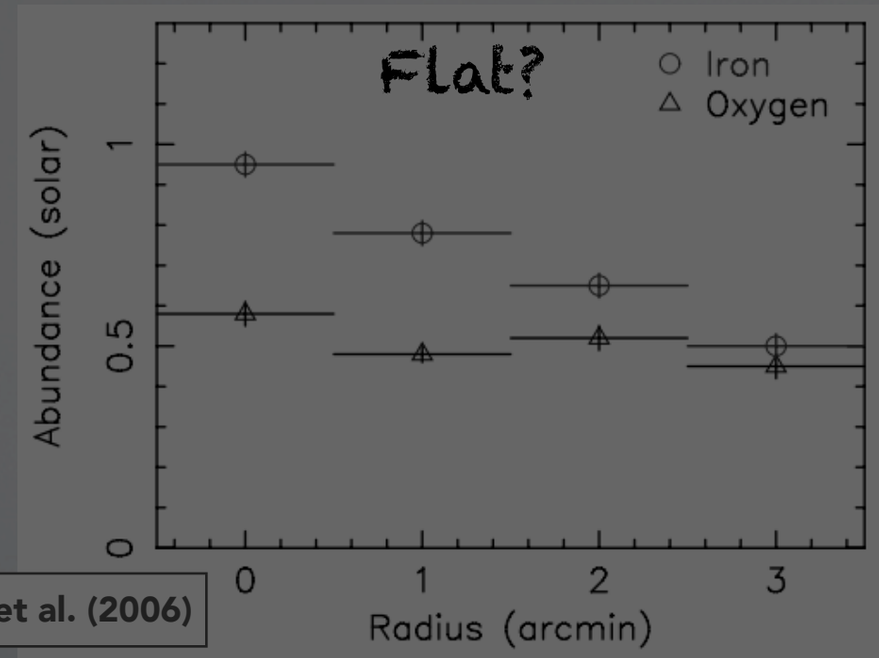

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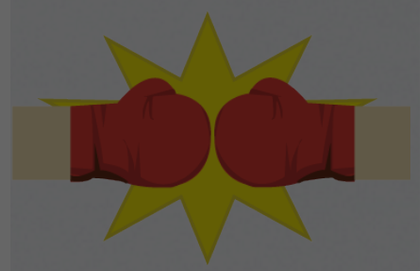

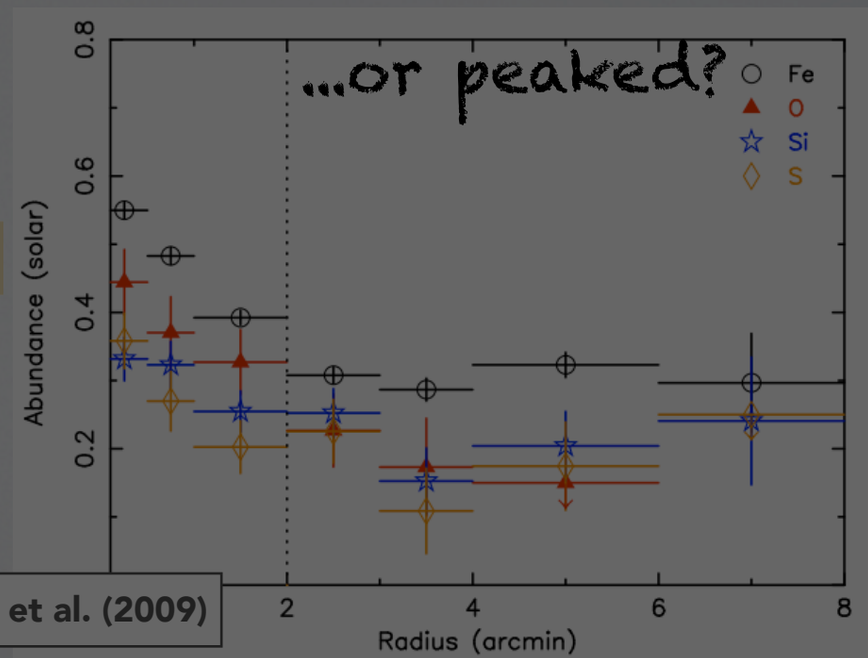

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Methods

The ***CHE***mical ***E***nrichment ***R***gs ***S***ample (***CHEERS***!)

(PI: Jelle de Plaa)

- Cool-core galaxy ***clusters***, ***groups*** & ***ellipticals***
- O VIII line in RGS: > 5σ
- Nearby (z < 0.1)
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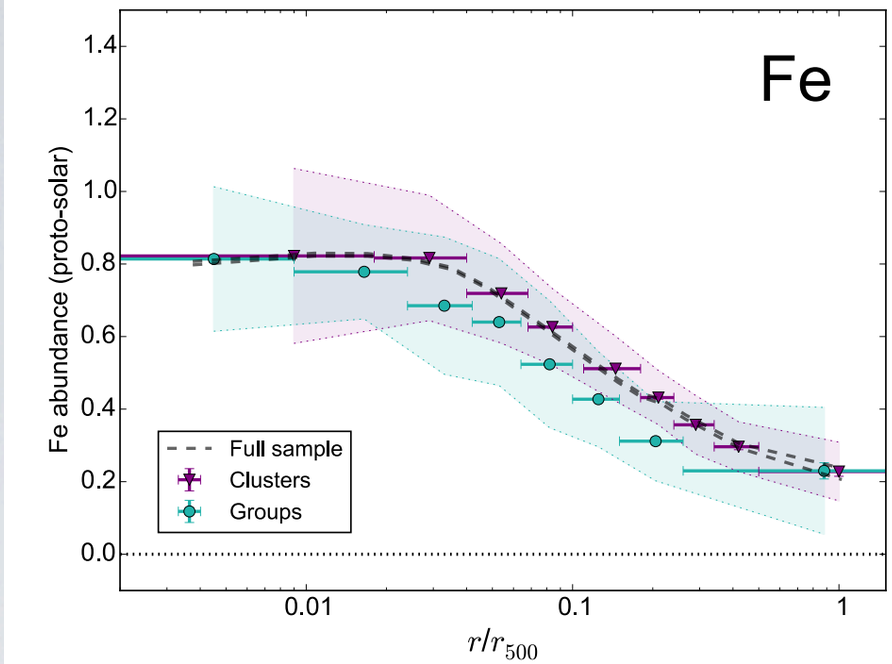
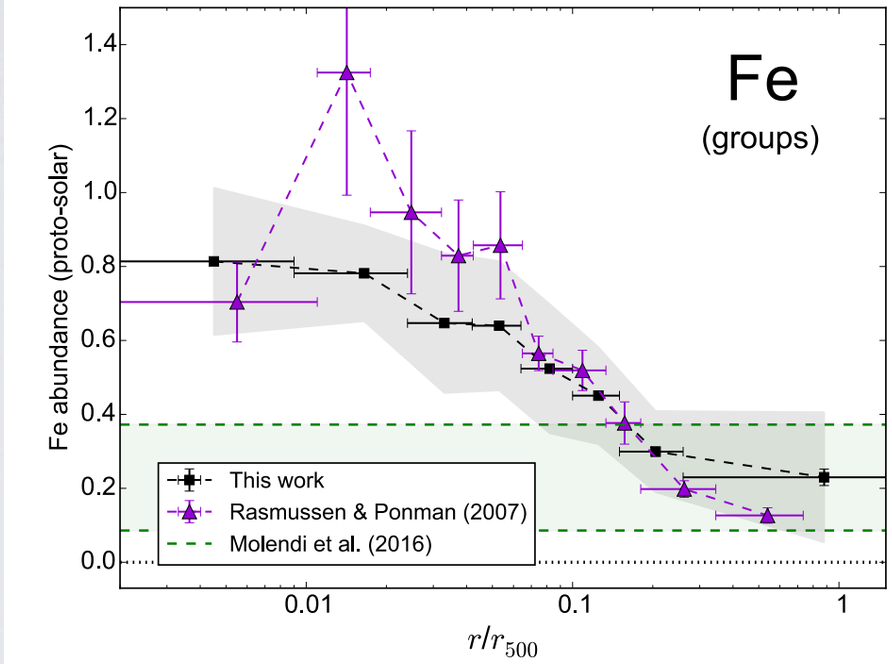
➡ ~4.5 Ms
of *XMM-Newton* total net exposure

Results





Systematic uncertainties under control:

- ✓ Projection effects
- ✓ Thermal modelling
- ✓ Background uncertainties
- ✓ Weight of individual observations
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Mernier et al. (submitted)

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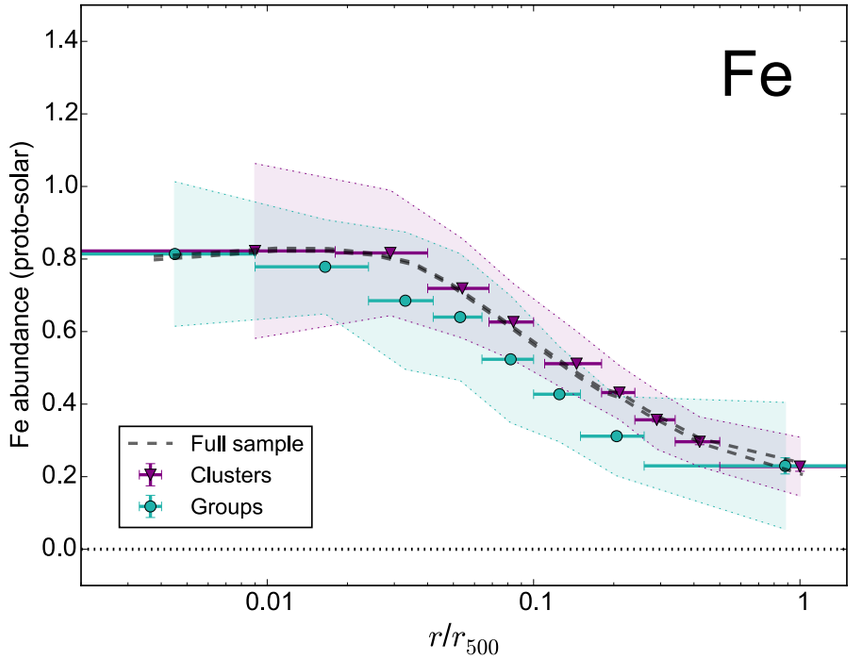

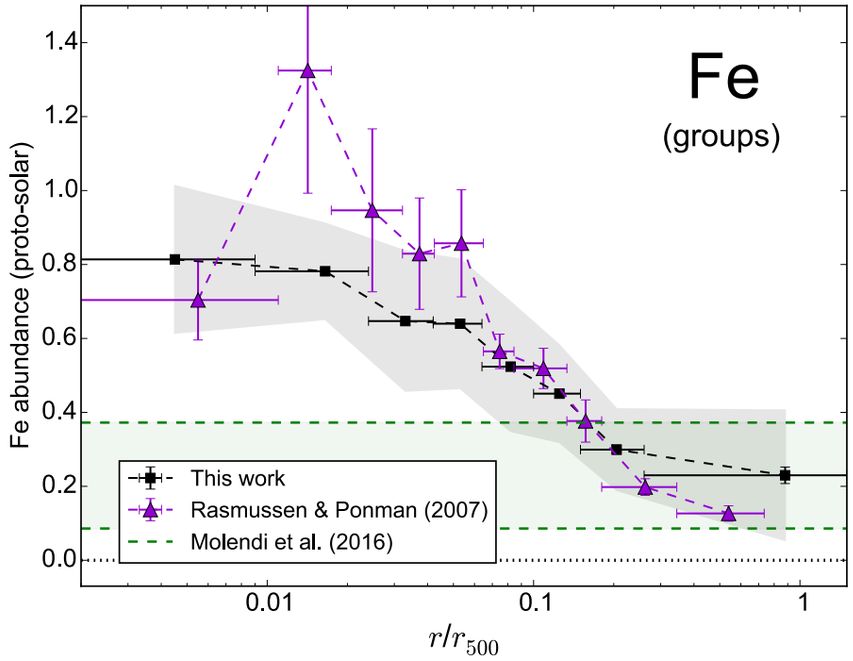

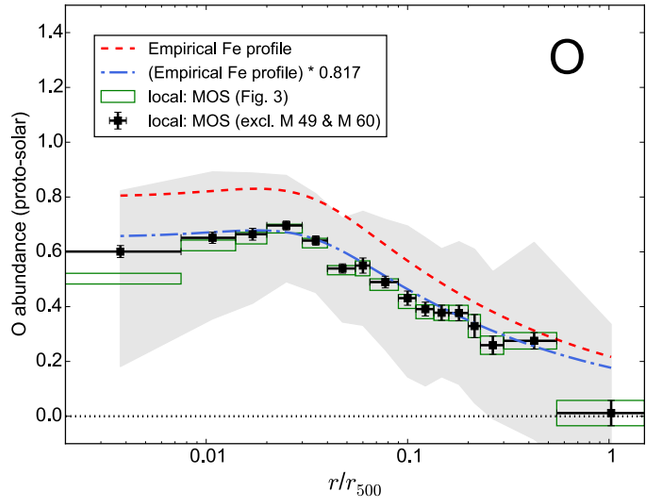

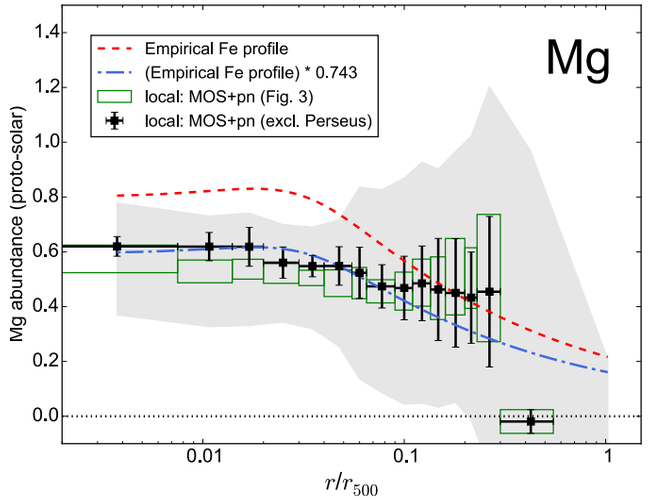

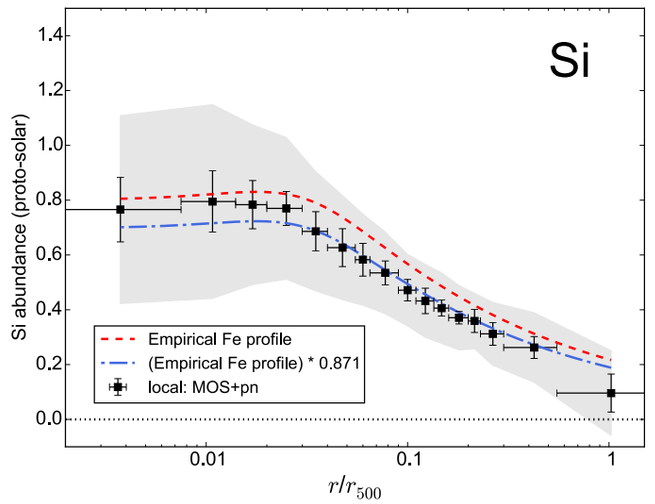

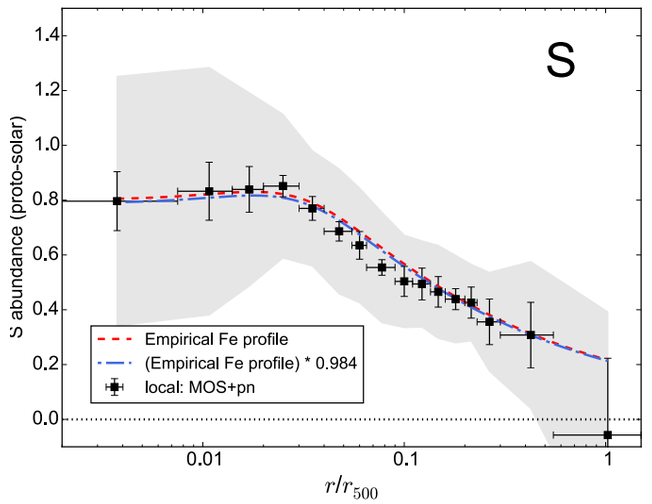

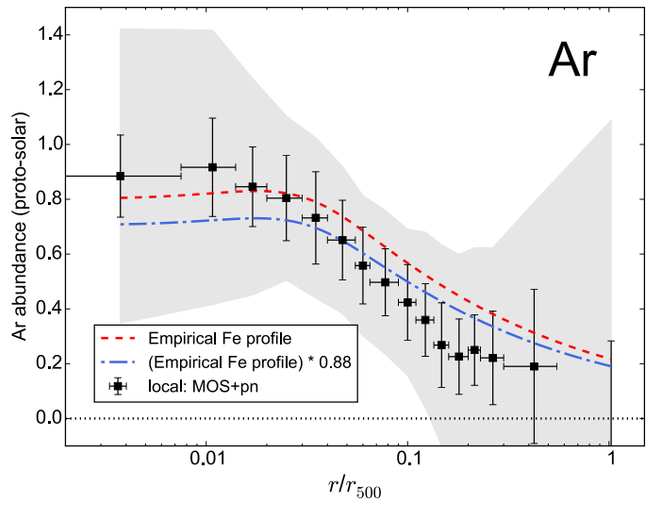

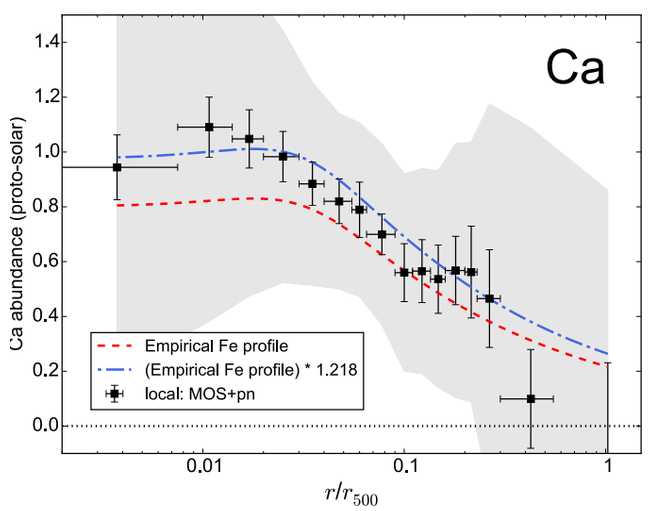

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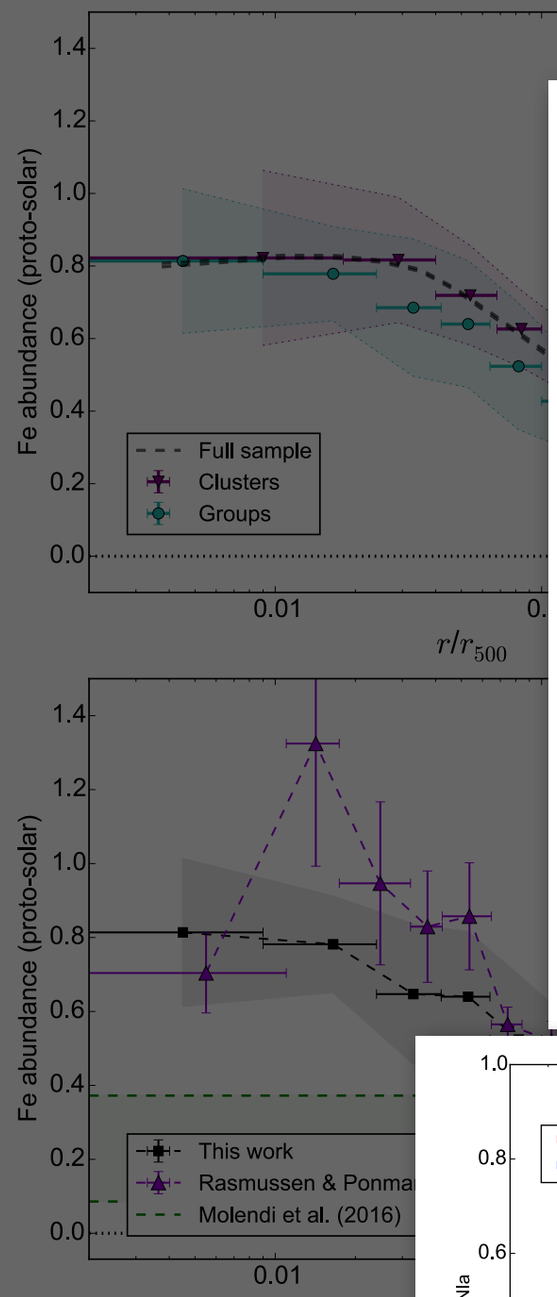

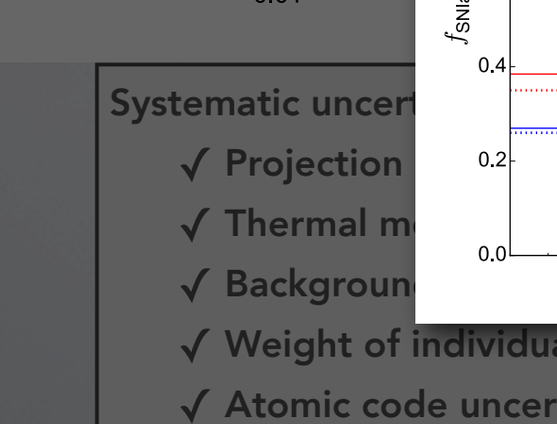

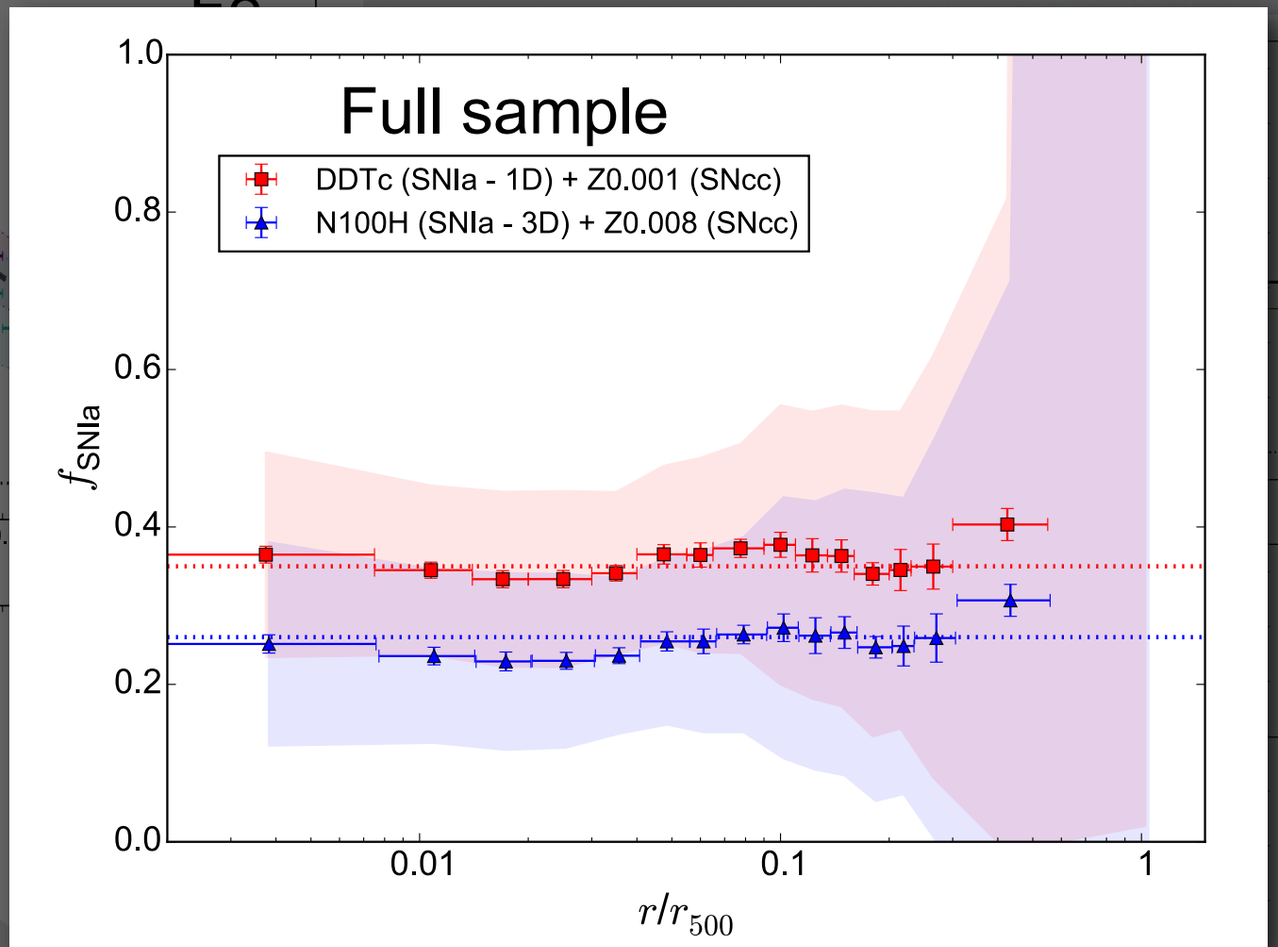

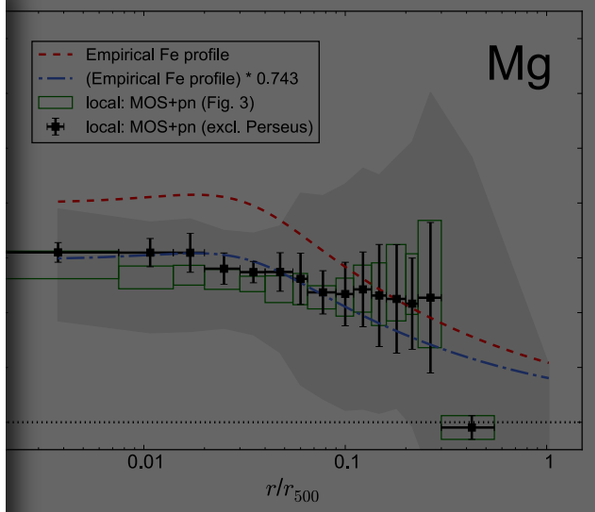

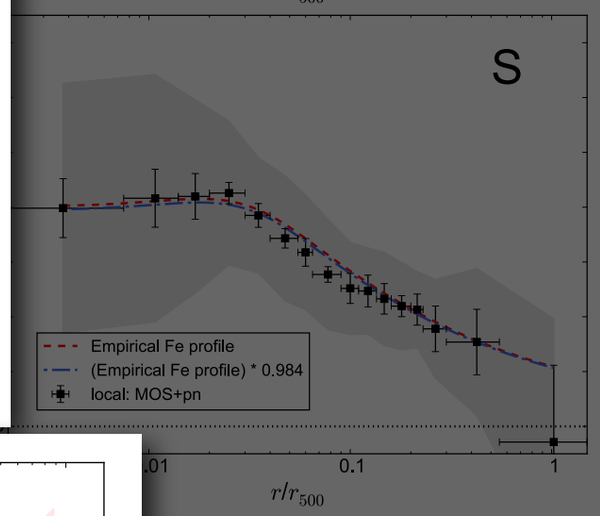

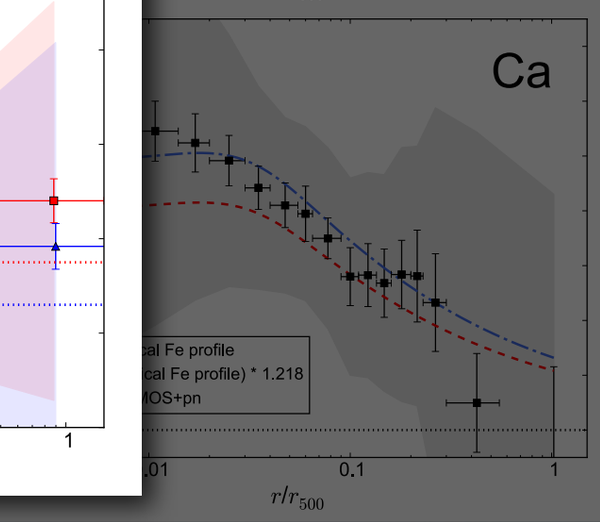

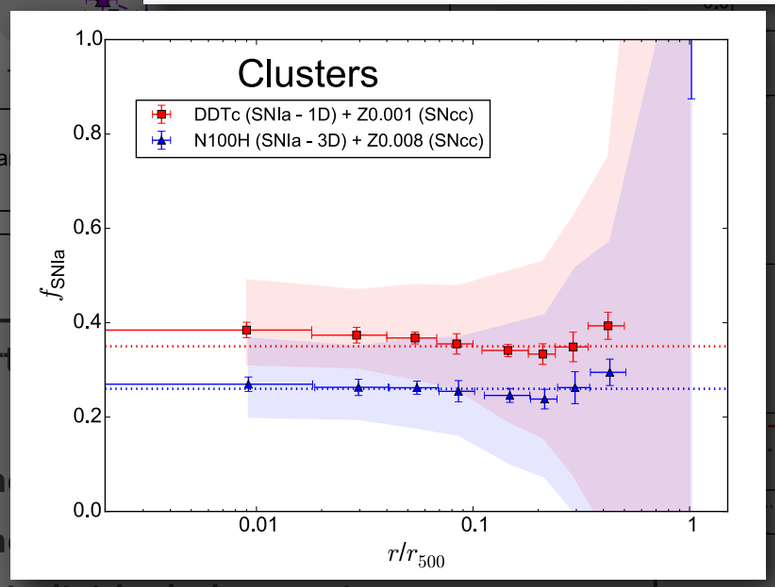

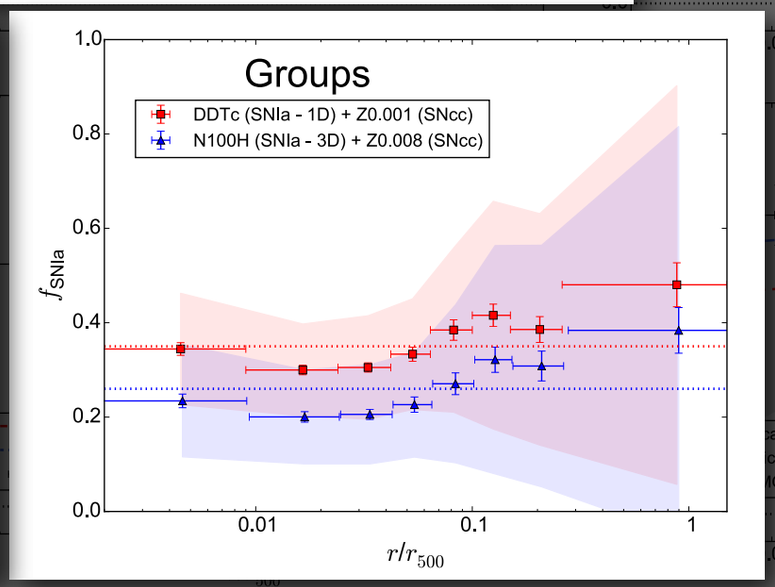

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Conclusions

Take home message

Type Ia and core-collapse supernovae enrich the ICM at the same proportion (up to ~0.5r_{500})

- Fe (produced by SNIa) centrally peaked, sometimes with an inner drop
- SNcc products (O, Mg, Si) are also centrally peaked
- Fe profile: very good agreement with previous measurements & simulations
- SNIa and SNcc contributions to the ICM enrichment may share the same origin, and occur at similar epochs
- Need for better measurements in the outskirts (Hitomi 2, Athena) and improved simulations in the very core