The CaFe Experiment:

Isospin Dependence of Short-Range Correlations in Nuclei

C. Yero
(On behalf of the CaFe collaboration)

Hall C Summer Collaboration Meeting

June 17, 2022

Proposal: PR12-16-004

Which nucleons form SRC pairs?

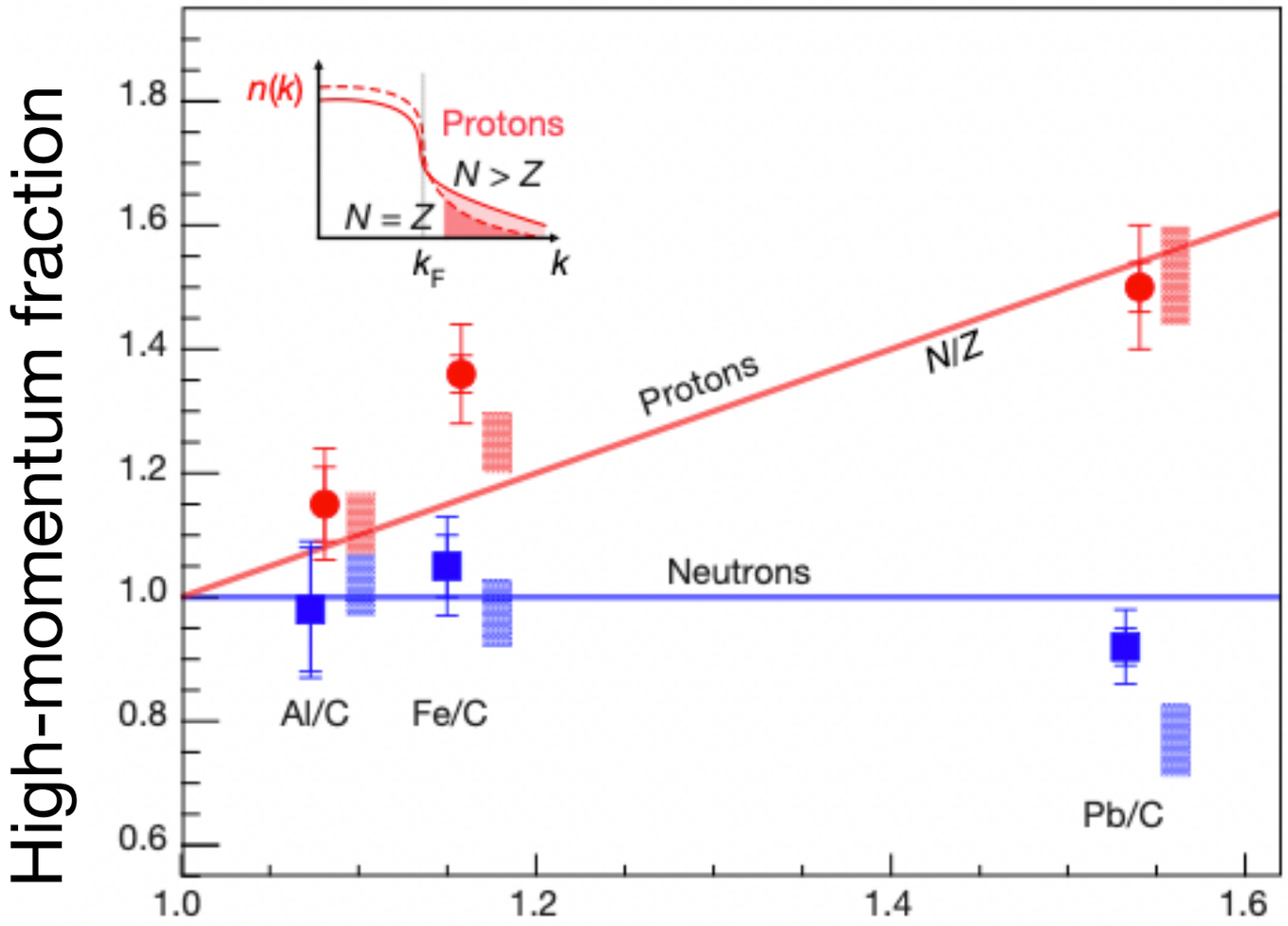
SRC pairs:

- account for almost all high momentum nucleons in nuclei
- are predominantly *np*

→ Which nucleons form pairs

→ How does adding neutrons speed up protons?

→ *A* vs *N/Z* dependence?

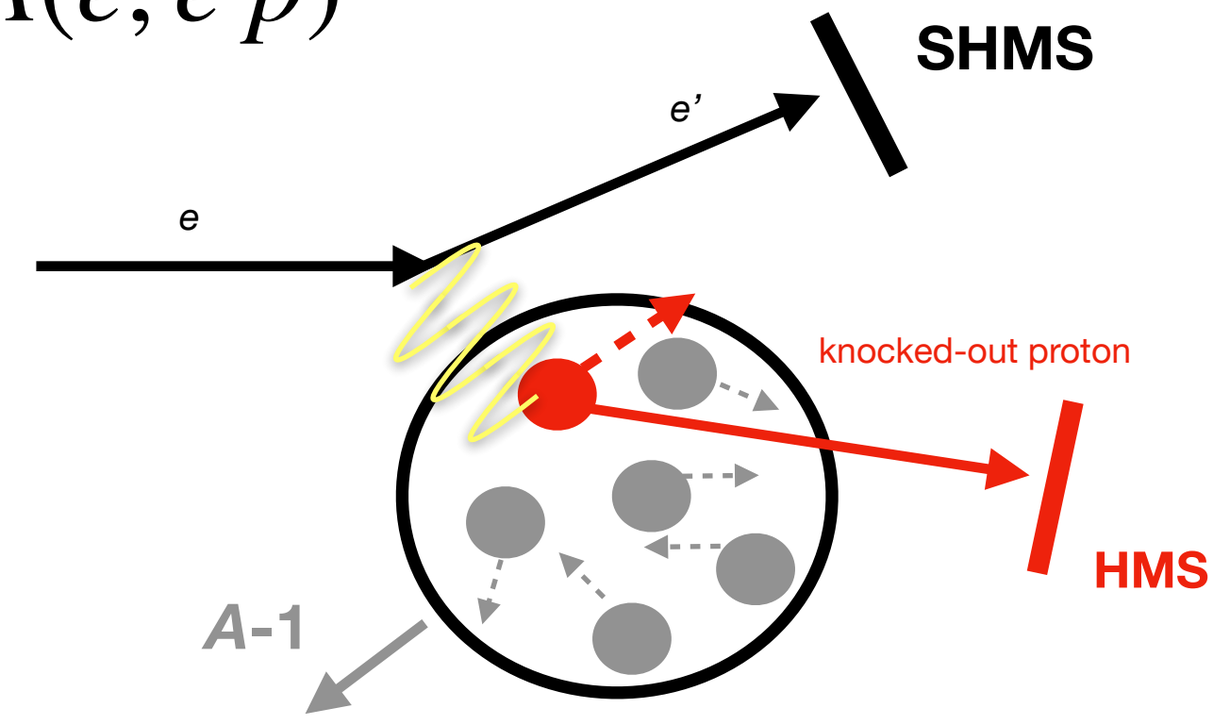


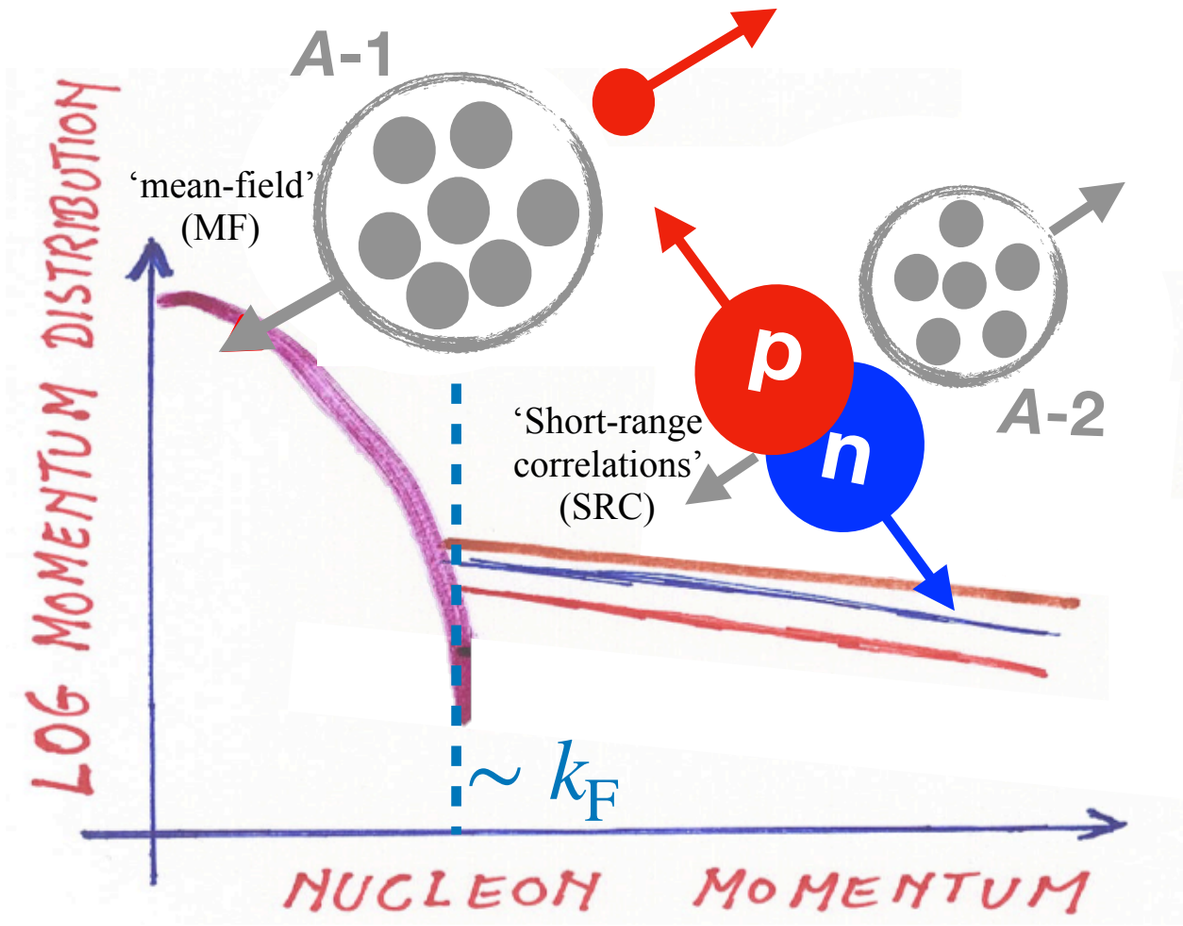
Please refer to Dien Nguyen's Talk
(Hall C 2022 Winter Meeting) for details !

M. Duer et al. (CLAS collaboration), Nature 560, 617 (2018)

What will CaFe measure ?

$A(e, e'p)$





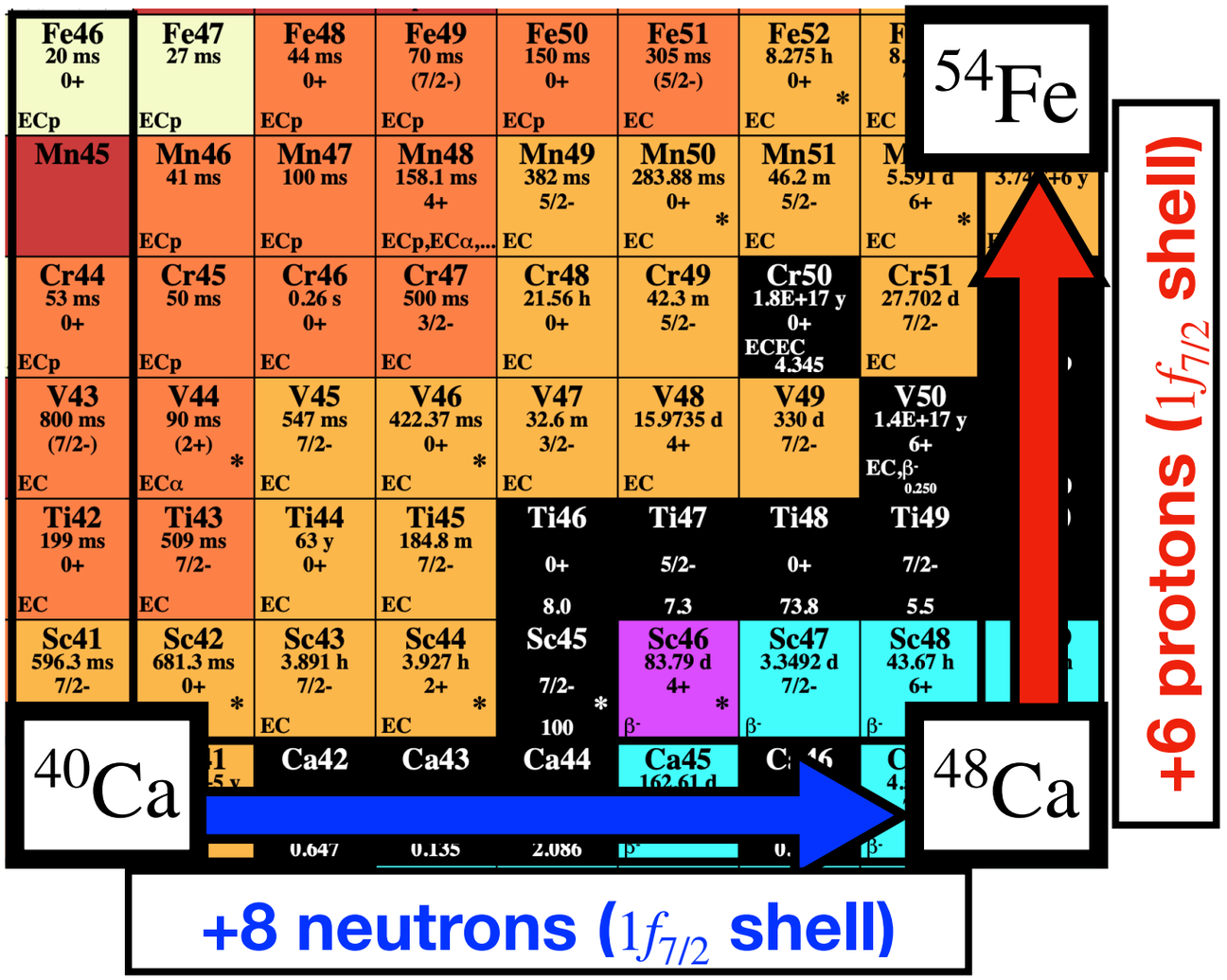
MF : $k_r < 250$ MeV/c
SRC : $k_r > 300$ MeV/c

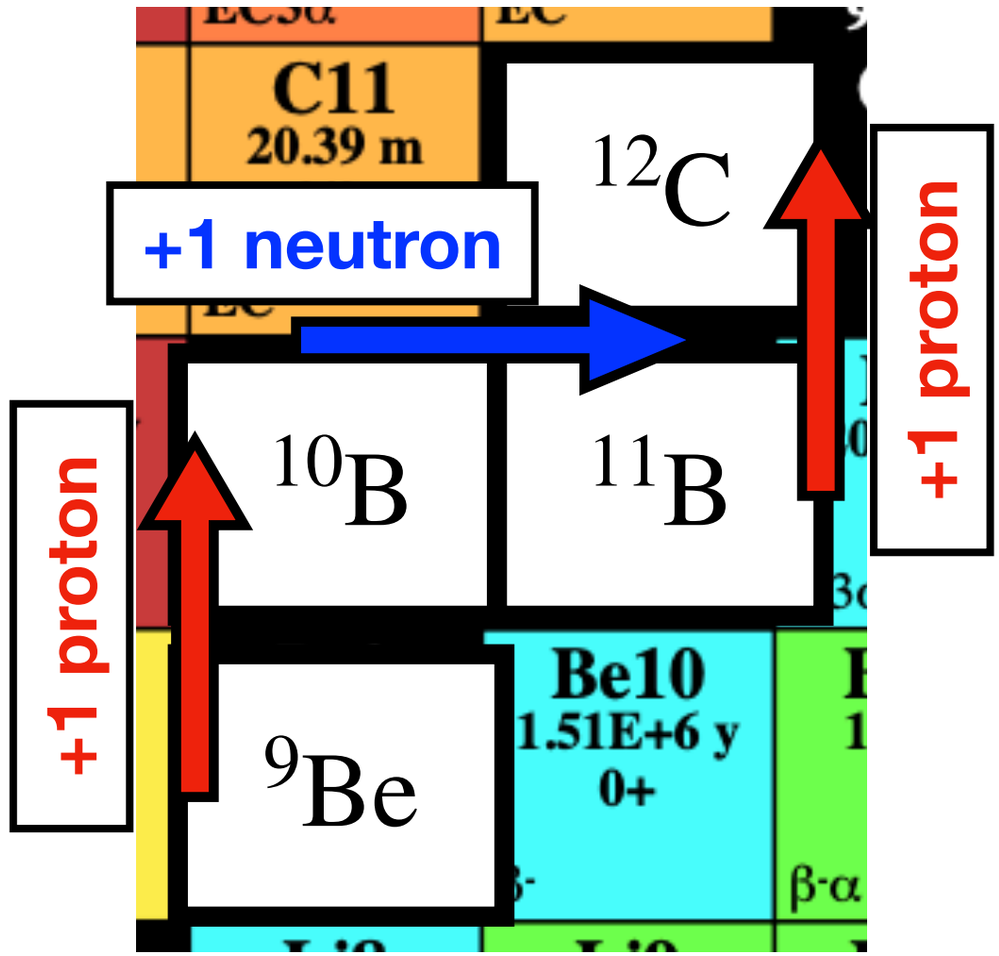
High-momentum fraction:

$$\frac{A(e,e'N)^{SRC}/A(e,e'N)^{MF}}{^{12}C(e,e'N)^{SRC}/^{12}C(e,e'N)^{MF}}$$

	Ebeam (GeV)	E' (GeV) SHMS	θ_e Degree SHMS	$\lvert P_p \rvert$ GeV HMS	θ_p Degree HMS	Pm GeV	Q2_center
SRC (high-pm kin)	10.6	8.55	8.3	1.325	66.4	0.4	2.1
MF (low-pm kin)	10.6	8.55	8.3	1.820	48.3	0.15	2.1

Which Nuclei to Investigate ?

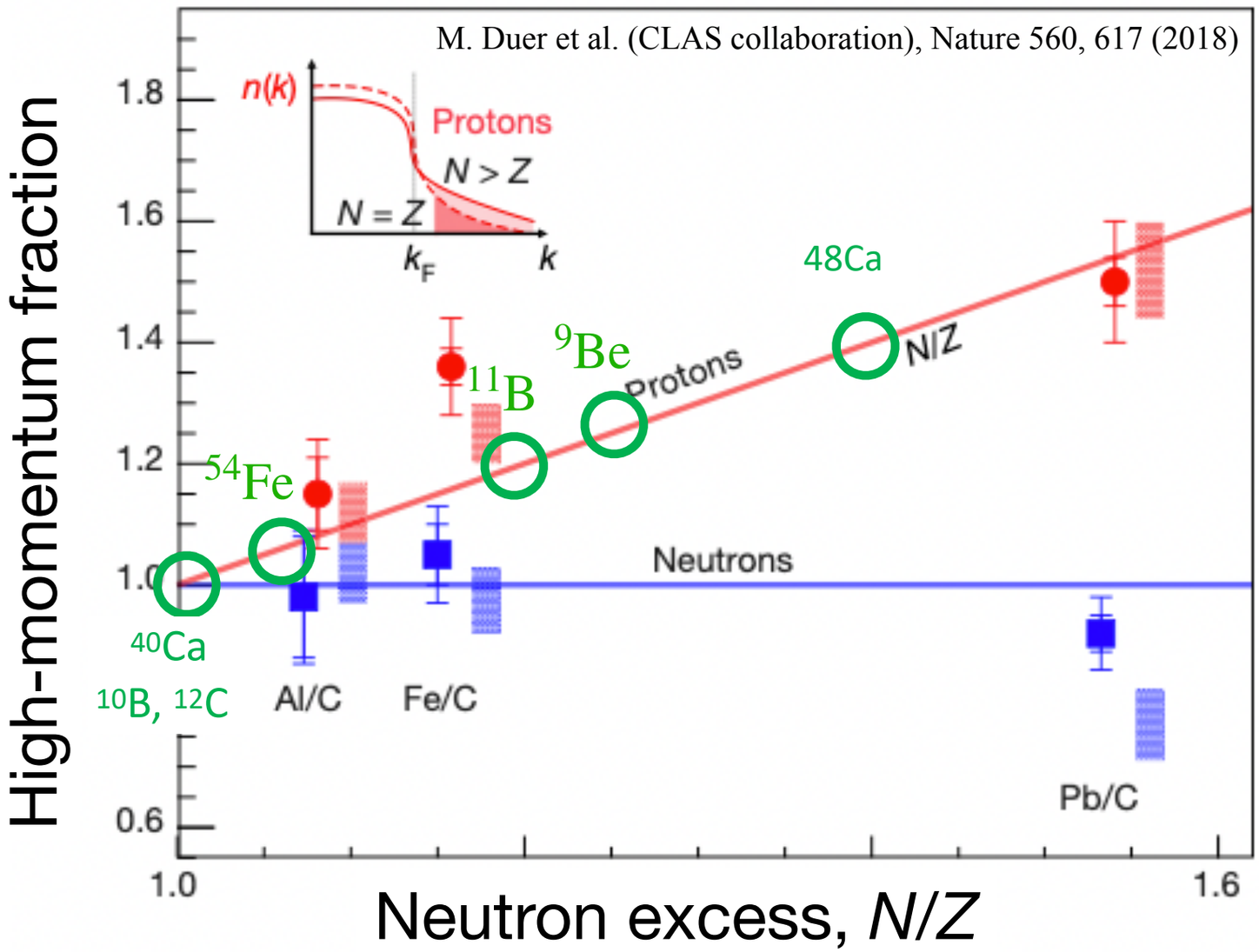




Which nucleons form pairs?

- How does adding +8 $1f_{7/2}$ neutrons to a $2s1d$ closed shell ^{40}Ca change the proton pairing?
- How does adding +6 $1f_{7/2}$ protons to ^{48}Ca change the proton pairing?
- What about $1p$ nuclei? 9Be → 10B → 11B → 12C

Projected CaFe Results



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- CaFe 4 PAC (8 real days): Aug 18 - Aug 26, 2022

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Please visit our CaFe Wiki for more information.