Observing Filaments Between Galaxy Clusters with NenuFAR
How to Probe Cosmic Magnetic Fields

NenuFAR workshop presentation
Etienne Bonnassieux, DRANOEEL postdoctoral research fellow at UniBo

Collaboration with A. Bonafede, F. Vazza, C. Ferrari,
F. de Gasperin, C. Tasse, ...
Outline

- Science Goals

- Why NenuFAR?

- Why us?
Galaxy filaments & Cosmic Magnetism
Galaxy filaments & Cosmic Magnetism

To study cosmic magnetism:

- Magnetic field in clusters dominated by ICM evolution
- To understand primordial magnetic field, need to go outside clusters

BUT

- If there are no relativistic electrons to decay in a forest, what can astronomers know about its magnetic field?…
Galaxy filaments & Cosmic Magnetism

To study cosmic magnetism:

- Magnetic field in clusters dominated by ICM evolution
- To understand primordial magnetic field, need to go outside clusters

Filaments: best environment for both presence of emitting particles and unmarred cosmic magnetic field
Galaxy filaments & Cosmic Magnetism
Galaxy filaments & Cosmic Magnetism
Galaxy filaments & NenuFAR
Galaxy filaments & NenuFAR

Observational constraints for filament observations:

- Physics of cosmic magnetism traced by large-scale, diffuse structures
- Emission mechanism of said structures more effective at lower frequencies
- Presence of foreground/embedded point sources imposes angular resolution constraints to improve confusion limits
Galaxy filaments & NenuFAR

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→ NenuFAR standalone in imager mode + supersynthesis
Galaxy filaments & NenuFAR
Galaxy filaments & NenuFAR
Current Results

Article
First Lights on the Cosmic Magnetism Project with NenuFAR: the Coma Cluster field

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Abstract: This paper describes the first results from NenuFAR, a new 50m radio telescope installed at the Plateau de Calern in the French Alps. We present the first observations of the Coma Cluster, a nearby group of galaxies located at a distance of 27.7 Mpc.

Keywords: galaxy clusters; observational cosmology; radio interferometry; zelander; 1. Introduction

1. Introduction

The Coma galaxy cluster is not only one of the last historically observed galaxy clusters [1], but also the first galaxy cluster with the detection of a radio halo [2] or radio relic [3–4] in the literature. As an object known to host several physical components of considerable scientific interest, it was chosen as the first galaxy cluster to be observed as part of the NenuFAR Cosmic Filaments & Magnetism Pilot Survey project.
Current Results

NenuFAR

ROSAT

GLEAM
Current Results
The Team

KP currently has the following participants:

Etienne Bonnassieux, Annalisa Bonafede, Franco Vazza, Chiara Ferrari, Francesco de Gasparin, Cyril Tasse, …
The Team

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And maybe...you? ;}
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And maybe...you? ;)

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