

# **Modelling the Galactic Magnetic Field**

Original dates: 6 - 10 July 2020 Lorentz Center @Oort

Held virtually from 7 - 21 July 2020

Physical workshop rescheduled to 18 – 22 October 2021

## **Scientific**

The overarching goal of this meeting was to plan and discuss the next step towards a comprehensive model for the magnetic field in the Milky Way. Through this meeting we plan to address several important research questions in the field: How can Ultra-High Energy Cosmic Ray (UHECR) deflections best be used as a tracer for the Galactic magnetic field (GMF) structure? What are the most important non-standard observational tracers for the GMF and how can they best be exploited? What can we learn from galaxy formation and the observations of other galaxies? What is the interplay between cosmic structure, magnetic fields and the origin and propagation of extragalactic cosmic rays? How can we best use physics-based modelling of the galactic magnetic fields employing parametric or non-parametric Bayesian methods?

The IMAGINE collaboration has more than a dozen active projects on sub-topics that contribute to the goal of developing a realistic model of the Milky Way Galaxy's magnetic field. The goal of this meeting was to bring together researchers across these topics, to drive these projects forward, and ultimately lead to several publishable results in the next 1-2 years.

Despite the challenges presented by the current situation and the move to the virtual format, good progress was made on many of the active projects. We had a high level of engagement with many fruitful discussions.

In addition, several new collaborations were initiated and some new project ideas were discussed.

## **Organization**

### **Preparation/Duration of the workshop and time management**

Given the international nature of this meeting and geographic spread of the participants (15 countries from Australia to North America and Europe), scheduling was challenging and we were limited to 1-2 hours per day that would be at a reasonable time of day for a majority of participants. Thus, the workshop was spread over ~2 weeks instead of 1, and still had to be reduced in scope from the original format.

Some highlights:

- We held 12 major sessions (plus some additional shorter sessions) using the Zoom platform.
  - This included 2-hour introductory and concluding sessions at the beginning and end of the two-week period.
  - The other sessions ranged from 1-3 hours in length and were organized and hosted by the project leaders of individual sub-topics.
  - Most days had 1 scheduled session.
- We had a total number of at least 68 unique attendants from 15 countries (including statistics for all but one session).
- On average, 19 people attended each session and each participant attended an average of 3.4 sessions.
- We hosted a "hack-a-thon" with some shorter (almost daily) touch-point sessions to encourage hands-on experience with our software package. Several new participants attended the hack-a-thon sessions.
- Each session was recorded and the recordings were made available to all participants.
- We created a google doc repository, which contains notes from each project meeting.
- We have ongoing communication via slack. During the meeting the number of members on our slack channel and mailing list substantially increased. On slack alone, we quadrupled the number of participants from 20 to more than 80.

### **Short- and long-term plans for follow-up**

The IMAGINE collaboration holds virtual seminars every several months to keep the collaboration engaged. We plan to continue this, with the next seminar planned for later this fall.

We hope that our rescheduled in-person workshop can proceed as planned next October.

### **Lessons learned for future virtual events**

The majority of our participants gave positive feedback on the format of the meeting. Several commented that they liked the extended timeline (spreading the sessions over two weeks and having only one session per day).

At our introductory and concluding sessions we randomly divided the participants into small breakout groups having 3-4 participants for ~5 minutes. We had positive feedback on these sessions as well as it allowed for some random interactions and more casual conversation, similar to what one might get at a coffee break. Scheduling more of these sessions might be a good idea!

- **Francois Boulanger**, Ecole Normale Supérieure
- **Jörg R. Hörandel**, Radboud University and Vrije Universiteit Brussel and Nikhef
- **Jennifer West**, University of Toronto
- **Tess Jaffe**, University of Maryland and NASA Goddard Space Flight Center
- **Torsten Ensslin**, Max Planck Institute for Astrophysics