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Towards understanding the formation of the universe

Innovative approaches to extracting the 21-cm Hydrogen Signal

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Area of expertise : Machine Learning, Data Analysis

Main contribution in SKA : **SDC3a** and SDC3b

Current project (started two weeks ago) : deep dive into the SDC3a

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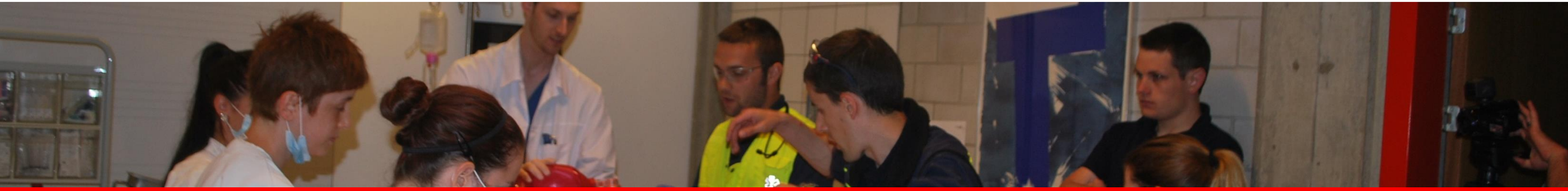

SDC3a - Foregrounds

- The 'Foregrounds' challenge goal is to remove obscuring sources of emission which prevent analysis of the underlying hydrogen-21cm signal from the Epoch of Reionisation (EoR).
- Participants are asked to extract the cylindrically-averaged power spectrum of the EoR signal, clean from foregrounds contamination.
- Challenge is over, and promising methods were implemented, but many innovative and interesting technics were highlighted but not tested.
- My goal is to dive deeper into existing and new approaches to propose an even better method to solve the SDC3a challenge.

https://sdc3.skao.int/challenges/foregrounds

What's coming

1. **Review and fine-tuning of existing teams' methods**
2. **Exploiting Spatial and Frequency Dimensions Simultaneously with 3D CNN**
3. **Diffusion models implemented as denoiser**
4. **Other emerging methods (looking closely at LLM current evolutions)**
5. **Let me know if you have ideas!**

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