Lorentz center
Workshop @Oort

Accelerating the Search for Dark Matter with Machine Learning

15 - 19 January 2018, Leiden, the Netherlands

Workshop introduction & objectives
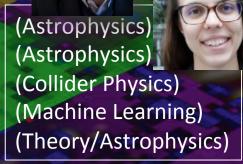
Sascha Caron (Radboud University and Nikhef)

Scientific Organizers

- **Gianfranco Bertone, UvA Amsterdam**
- **Francesca Calore, CNRS Annecy-le-Vieux / U Savoy Mont Blanc**
- **Sascha Caron, Radboud U / NWO-Nikhef Amsterdam**
- **Tom Heskes, Radboud U**
- **Roberto Ruiz de Austri, IFIC Paterna**

(Astrophysics)
(Astrophysics)
(Collider Physics)
(Machine Learning)
(Theory/Astrophysics)

Multi-disciplinary

Topics

- **Astronomical Data**
- **Deep Learning and Image Analysis**
- **Direct and Indirect Searches**
- **Unsupervised Learning**
- **Large Hadron Collider**
- **(Semi-) Supervised Learning**
- **Dark Matter Models**
- **Active Learning & Experimental Design**

The Lorentz Center organizes international workshops for researchers in all scientific disciplines. Its aim is to create an atmosphere that fosters collaborative work, discussions and interactions. For registration see: www.lorentzcenter.nl

Activations of the different convolutional layers using the Bullet Cluster (credit: Luc Hendriks). Poster design: SuperNova Studios . NL

Researchers coming to this workshop bring together expertise in experimental and theoretical particle physics, astrophysics, astronomy, statistics and Machine Learning.

Objectives:
- The workshop is planned to be a Kickoff meeting to generate a **new open research community**
- a **whitepaper** describing typical problems in Dark Matter research and how we solve those with the help of Machine Learning
- Sustainability: **Follow-up workshops** (also via video) → Volunteers ?
- A **webpage** (www.darkmachines.org), also to share data and ML tools developed within the community
- A **mailing list** for the DM-ML community.

Daily setup

9:00 start (use the indico webpage)
- Summary of the Discussion sessions (not on Monday)
- Introduction into a DM topic
- Introduction into a ML topic
- First examples
- Discussion
- Lunch break
- A "cross-link" between ML topic and different DM topics
- 1h of Discussions in parallel subgroups →New ideas + Whitepaper
- Brief talks on "hot topics connecting ML+DM"

Around 16:30 end

Monday evening (Today)
- Wine and Cheese

Wednesday evening
- Dinner and Boar trip

Friday:

Workshop summaries → We are going to select speakers…