GRAND Collaboration Meeting
Warsaw 2025

Wrap-up & Perspectives

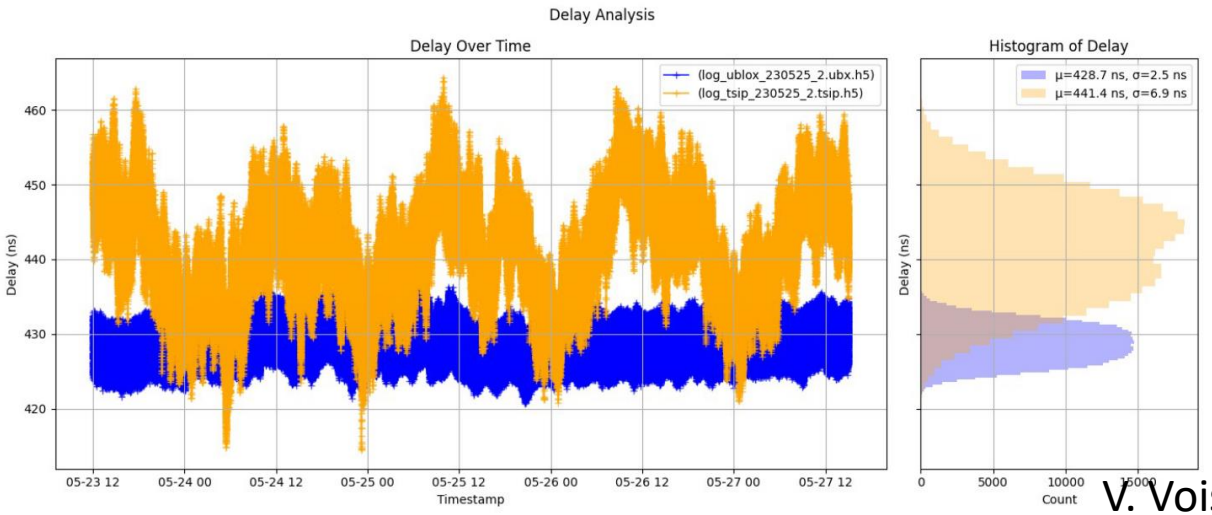
Olivier Martineau - LPNHE - CNRS/SU
Kumiko Kotera - IAP - CNRS/SU

GRANDProto300

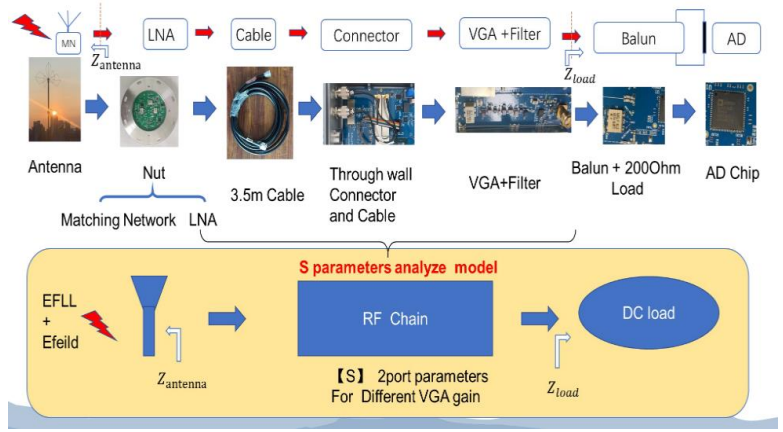
- 18 contributions! A vivid activity ☺
- Operations
  - Huge amount of work to run,understand, quantify and improve detector, from antenna down to data server
  - **Presently impeded by detector stability issues… Ferrites inductances guilty? ➔ under test now!**
  - Reinforce collaboration & organisation for better results!
  - Upgrade efforts well on the way (FEBv2 by Xu Xing/PMO)
  - … Monitoring tools to be implemented!
- Trigger
  - Recent effort by 2+ groups to better understand and qualify our DU-level trigger (T1) ➔ T1 suspected as one main cause for our reduced CR-detection efficiency
  - Efforts for more advanced methods on the way (NUTRIG, Xidian)

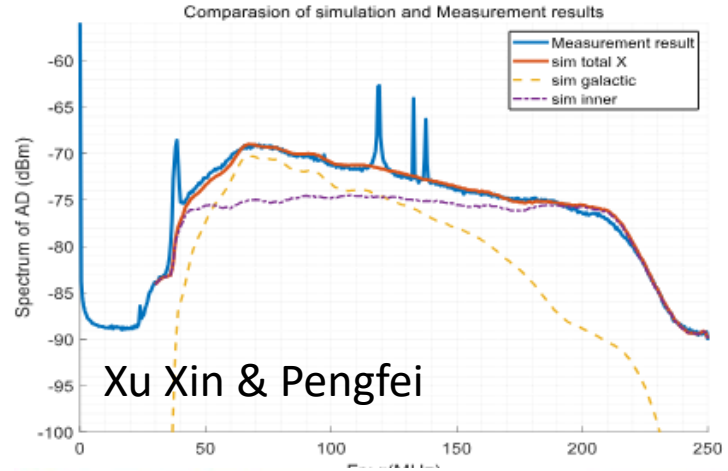
GRANDProto 300

- Calibration
  - High level of quality of our description and modeling of GP300 detection chain. A key element for our work!
  - Amplitude calibration (Galactic signal) now a robust tool! ☺… Other tools needed for directional calibration (antenna lobe, gound effects)
  - Time calibration efforts ramping up this year (in lab & out site ➔ more collaborative work needed to better quantify!)…



V. Voisin

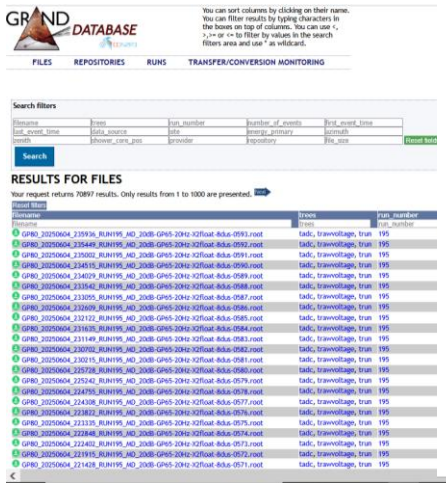


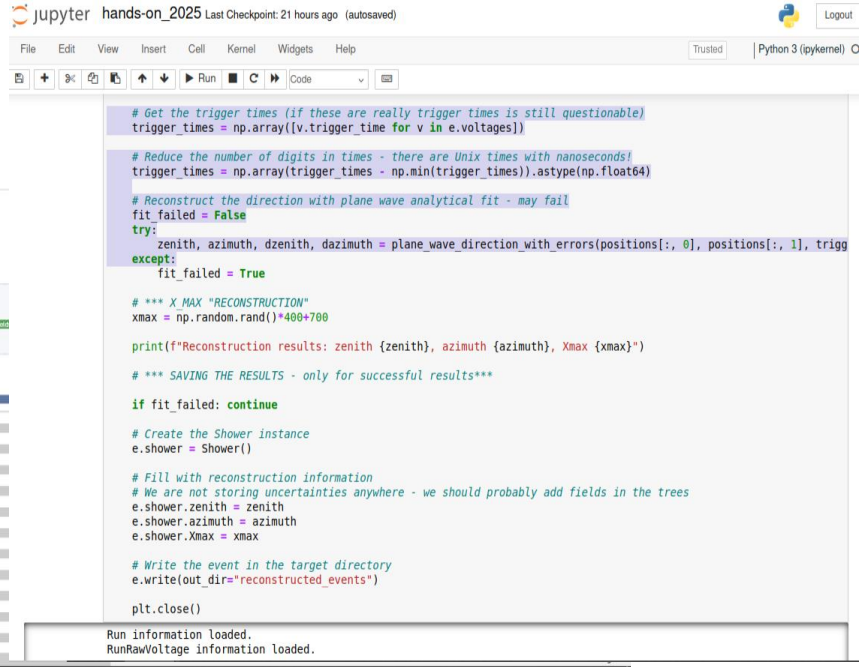


Xu Xin & Pengfei

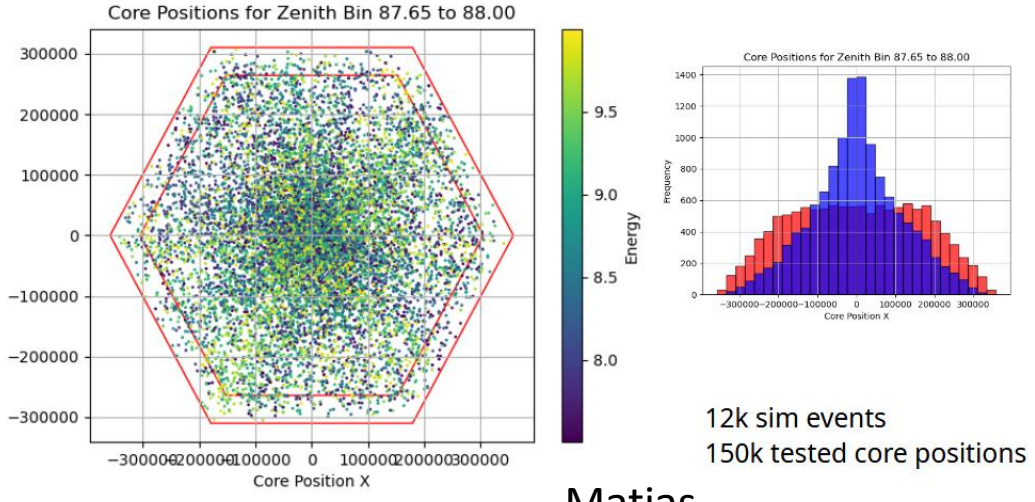
Software & sims

- GRANDLib & DC2 now coming to maturity!
  - Tools are (more and more) ready for your favorite analysis ➔ USE THEM and IMPROVE THEM. (way in: hands-on notebook)
    - Smooth data flow ☺
    - Environment « complexity » (Docker/Conda/…) being worked on ☺
    - Branches being merged ☺
    - Issues on analysis/reco variables management wrt ROOT?
  - Cannot be a one-way deal: users also have to contribute to the code
- Great dedication of a very small team… who **needs help**! ➔ <u>will</u> be organised.
- DC2-ZHaires: latest release (9k sims) on real layout with non-core contained events… Mass prod to come after that! Also T1 trigger to be included in sims!





Extremely Inclined Events™



Matias

Cosmic-ray Analysis

Chair: Mauricio

cf. GP300 slides

Simulations + GRANDlib cf. sim/soft slides

DATA

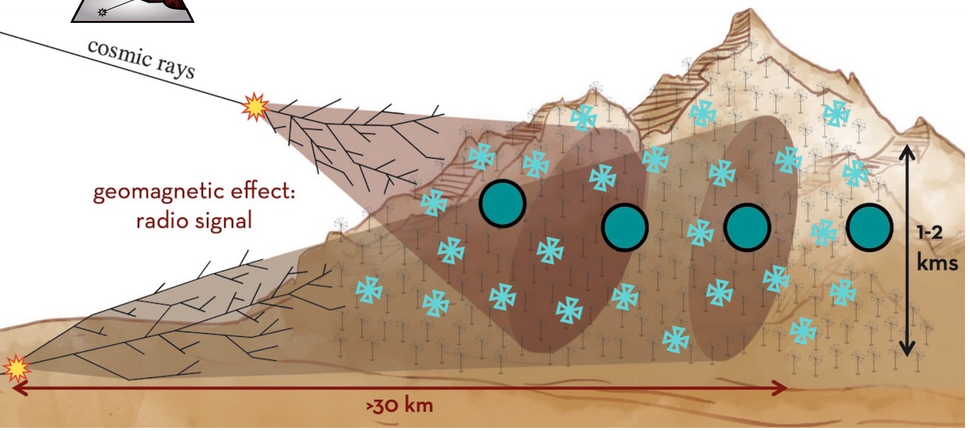
CR search (cuts)	**Efield deconvol.**	**Reconstruction**	**Exposure**	**CR distribution**
Hanrui, Kumiko, Jolan, Pengfei, Xishui	Kewen, Lukas	(GNN) Arsène+Aurélien (LDF) Lukas (ADF) Marion, Olivier, Pauline, Valentin	Clément, Sei	Clément, Mauricio, Rafa

Established strategy for plots & results to be shown at ICRC (cf Mauricio's email)

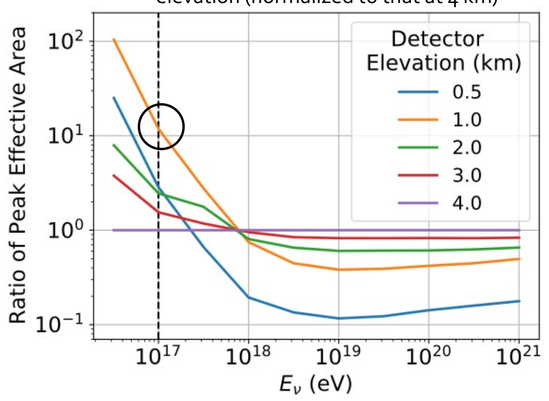
Powerful methods being developed for next stage of analysis

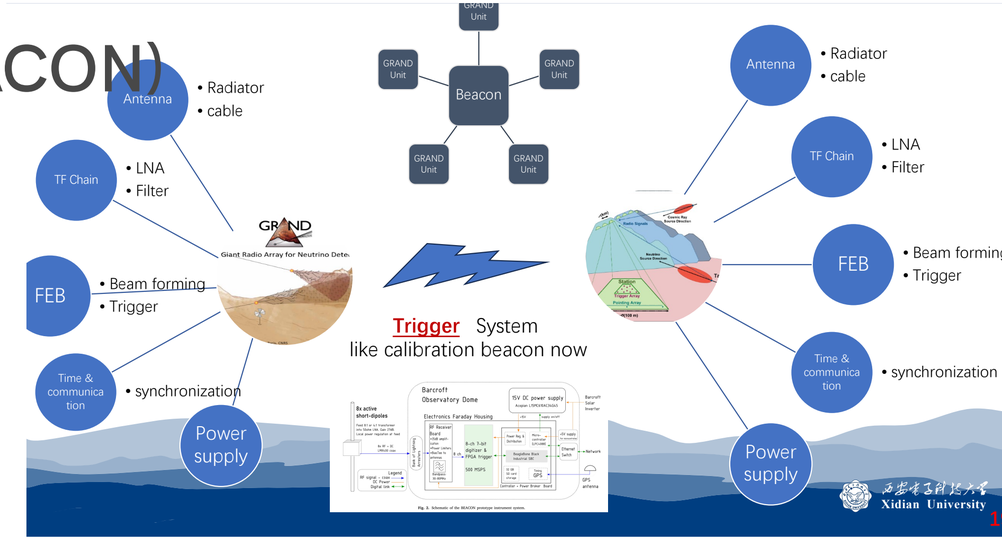
Improved cuts	**CNN**	Valentin
Jolan, Xishui, Simon C.	Jean-Marc, Oscar, Sara, Simon P.	**CNN** Aurélien, Washington

R&D for next phase of GRAND (GRAND-BEACON)



Phased array **peak effective area** at different elevation (normalized to that at 4 km)



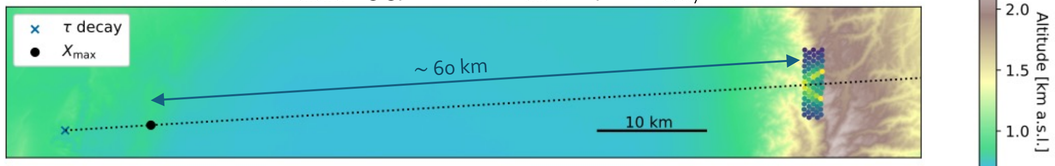


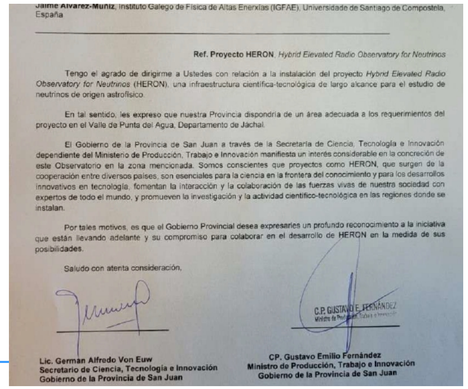
GRAND-BEACON SITE IN ARGENTINA

- Local support from San Juan Province
- Not far from ITEDA Mendoza and Auger
- Support from groups in Argentina:
  - CNEA Buenos Aires
    (ITEDA: CNEA-CONICET-UNSAM)
  - CNEA Bariloche
  - ITEDA Mendoza
  - AMIGA staff at Auger in Malargüe

GRAND-Beacon site Ingo Allekotte – 2025-06

$\tau^- \rightarrow e^- \nu_e \nu_\tau$ $E_{shower} = 5.57\ 10^{17}$ eV $\theta_{exit} = 0.42°$ $h_{decay} = 1.8$ km a.s.l.





Jaime Alvarez-Muñiz, Instituto Galego de Física de Altas Enerxías (IGFAE), Universidade de Santiago de Compostela, España

Ref. Proyecto HERON, *Hybrid Elevated Radio Observatory for Neutrinos*

Tengo el agrado de dirigirme a Ustedes con relación a la instalación del proyecto *Hybrid Elevated Radio Observatory for Neutrinos* (HERON), una infraestructura científica-tecnológica de largo alcance para el estudio de neutrinos de origen astrofísico.

En tal sentido, les expreso que nuestra Provincia dispondría de un área adecuada a los requerimientos del proyecto en el Valle de Punta del Agua, Departamento de Jáchal.

El Gobierno de la Provincia de San Juan a través de la Secretaría de Ciencia, Tecnología e Innovación dependiente del Ministerio de Producción, Trabajo e Innovación manifiesta un interés considerable en la concreción de este Observatorio en la zona mencionada. Somos conscientes que proyectos como HERON, que surgen de la cooperación entre diversos países, son esenciales para la ciencia en la frontera del conocimiento y para los desarrollos innovativos en tecnología, fomentan la interacción y la colaboración de las fuerzas vivas de nuestra sociedad con expertos de todo el mundo, y promueven la investigación y la actividad científico-tecnológica en las regiones donde se instalan.

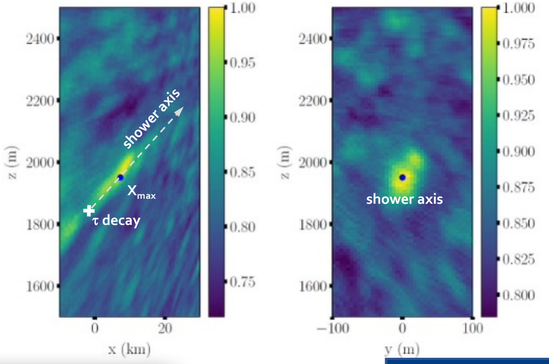
Por tales motivos, es que el Gobierno Provincial desea expresarles un profundo reconocimiento a la iniciativa que están llevando adelante y su compromiso para colaborar en el desarrollo de HERON en la medida de sus posibilidades.

Saludo con atenta consideración.

Lic. German Alfredo Von Euw
Secretario de Ciencia, Tecnología e Innovación
Gobierno de la Provincia de San Juan

CP. Gustavo Emilio Fernández
Ministro de Producción, Trabajo e Innovación
Gobierno de la Provincia de San Juan

3D mapping of emitting region of τ-induced air shower



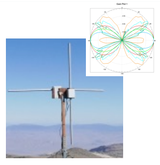
- CNEA (Argentina) – I. Allekotte, F. Sanchez, …
- Inst. Física de La Plata (Argentina) - **M. Tueros**
- Xidian Univ. (China) – **Pengfei Zhang**
- PMO (China) – **Zhang Yi**
- Institute of Physics, Czech Academy of Sciences (Czech Republic) – **M. Bohacova**
- IAP, Paris (France) – **K. Kotera, R. Alves-Batista, P. Minodier**
- LPNHE, Paris (France) – **O. Martineau**
- Université Paris-Saclay, CEA, List (France) - **A. Benoit-Lévy, A. Ferrière**
- Lab. Univers et Particules Montpellier (France) – **C. Guepin**
- SUBATECH, Nantes (France) - **V. Decoene**
- Univ. Clermont Ferrand (France) – **V. Niess**
- Univ. of the Aegean (Greece) – **A. Leisos, G. Vittakis**
- Hellenic Open University, Pátrai (Greece) – **S. Nonis**
- IGFAE, Univ. Santiago (Spain) - **J. Alvarez-Muñiz**, S. Cabana-Freire
- Penn State Univ. (USA) – S. Wissel, A. Zeolla, **K. Murase**

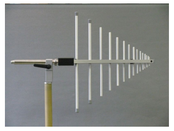
- **work for immediate future:**
  - **design optimization**: layout, antenna design & frequency range, antenna beams, gain…
  - **reconstruction performance** on low-threshold signals from standalone & phased array
  - impact of **topography**
  - **measurements of sky noise** when pointing at ground, need to conduct RFI site-survey

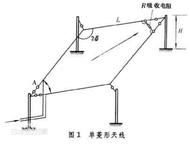
X

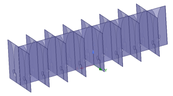
Part III：Candidates of antenna

Xidian University

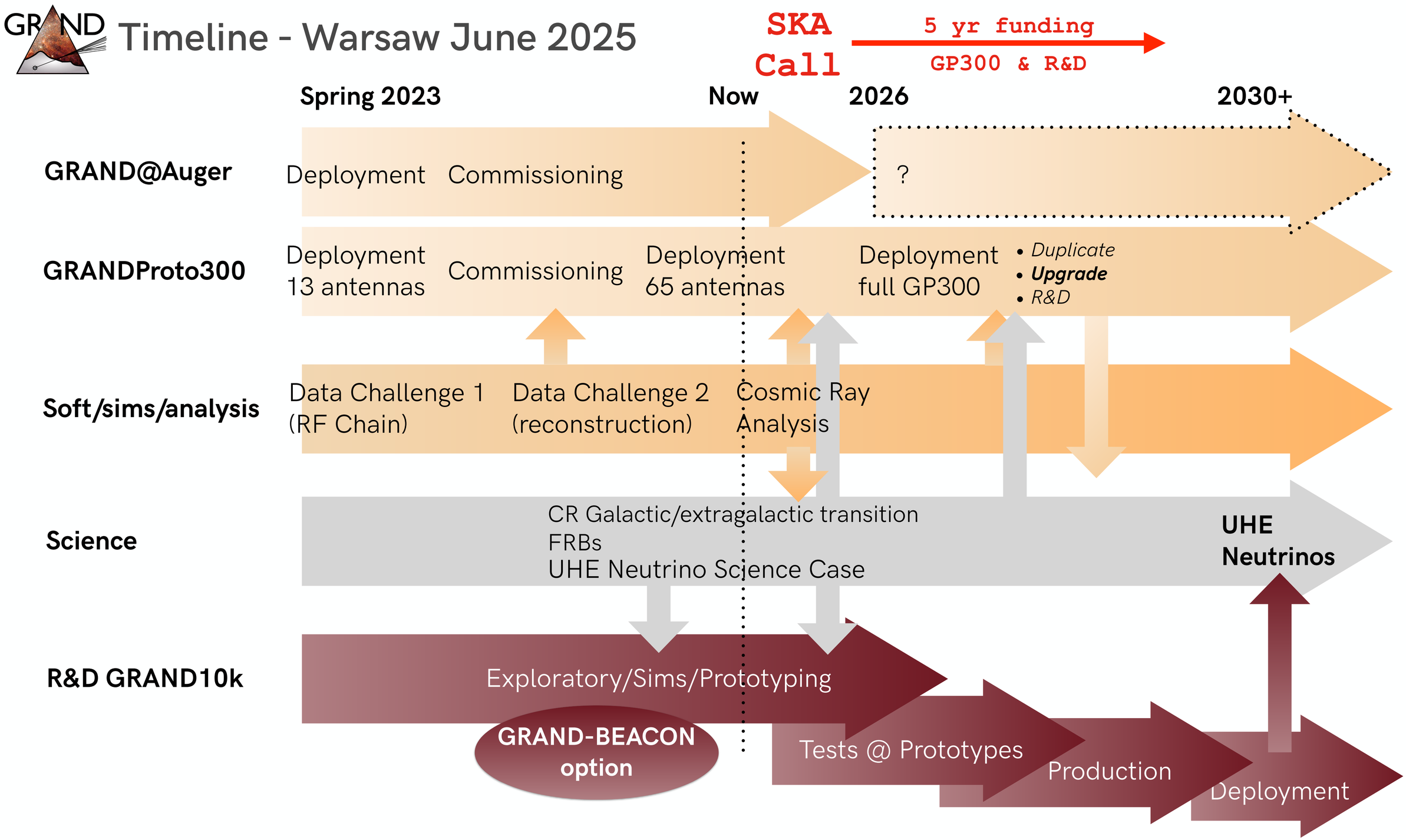

Active diplo


LPDA


Ling xing


TCA/Horn

Timeline - Warsaw June 2025



Board / Umbrella / Collab life

- Funding:
  - good perspectives planning ahead (SKA-China funding + running cost contribution to come in)!
  - Need for a long tem full funding planning (Finance WG ToDo)
- Work organisation: proceed **top-down** (Science Key Projects: what goals do we want to achieve) and **bottom-up** (Working Groups: what tools do we need to do that?) at the same time
- Meetings organisation: will follow up, but moving towards merging (some) forums (Analysis / ML / Software)
- **Documentation needed!!!**
  - Develop our best practices: notebook/examples; code integration within GRANDLib; code quality validation…
  - Reduce communication channels (ie quit Forge?) and promote internal notes instead?
  - Assign a « Documentation Committee » responsable?
- Jolan elected as ECS representative: congratulations!

Thank you Warsaw & the LOC!
looking forward to 2026: the GRAND Year