

NA6 — LatticeHadrons update





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Paris meeting — 19th October 2022

Co-ordinating institutions — LatticeHadrons (NA6)

Institution	Local co-ordinator	
Trinity College Dublin	MP	 Trinity College Dublin <small>The University of Dublin</small>
Edinburgh	Luigi Del Debbio	
INFN	Maria Paola Lombardo	 INFN <small>Istituto Nazionale di Fisica Nucleare</small>
Madrid	Gregorio Herdoiza	 UAM <small>Universidad Autónoma de Madrid</small>
Mainz	Hartmut Wittig	
Regensburg	Gunnar Bali	

Phase transitions in particle physics 28th Mar-1st Apr — GGI Firenze, Italy



- 70 participants
- Hybrid format - online & in-person

- Wide-ranging discussions between lattice & phenomenology
- White paper close to completion



- 1 Thermal Phase Transitions and Critical Points
- 2 Nature and Phenomenology of the Quark-Gluon Plasma
- 3 Methodological Challenges: Spectral Functions and Sign Problem
- 4 Cold and Dense Matter
- 5 Conformal Invariance
- 6 Cosmology, Topology and Axions
- 7 Statistical field theory
- 8 Machine Learning



NA6-LatticeHadrons*

Phase Transitions in Particle Physics

Report

from the meeting held in GGI, Firenze, 28 March - 1st April 2022, summarising future directions foreseen by the community based on input from the workshop.

In-person meetings (2022)

Numerical challenges in Lattice QCD 15-17 Aug — Meinerzhagen, Germany



- 38 participants
- Brought together numerical analysis and lattice QFT communities

- 81 participants
- Talks from lattice, phenomenology and experiment



5th Plenary Workshop of the Muon $g - 2$ Theory Initiative 5-9 Sep 2022 — Edinburgh, Scotland

- Three more core in-person workshops are now in preparation
- Week-long meetings, with time for in-person discussion
- White papers will be written following all meetings.

Hadron spectroscopy & structure	13-17 Feb	Regensburg U
Precision and BSM physics	5-9 Jun	UAM-CSIC Madrid
Algorithms for LFT	24-28 Apr	Edinburgh U

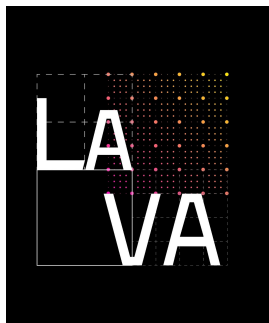
Workshops — 2022-2023

- LatticeHadrons will support a number of further workshops in 2023, building connections between phenomenology, lattice and experiment and exploring new methods to train the next generation of researchers.
- Interdisciplinary connections to HPC, numerical analysis, data analytics and beyond will be explored and developed.

SM&FT – XIX workshop ML approaches in lattice QCD LaVA collaboration	19-21 Dec 27 Feb — 3 Mar Feb 2023	INFN Bari, Italy TU München ECT*
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- Extending this list with further connections

- LAVA is a virtual platform for advanced e-learning in Lattice Field Theory
 - Web-page, graphic design and hosting at ECT* (Barbara Gazzoli, Gaia Stirpe)
 - First collaborative meeting to be held at ECT*
 - Advisory board being formed, first content written
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- Basics
 - Critical phenomena and RG
 - Finite temperature and density
 - Algorithms & ML
 - HPC hardware
 - Precision & BSM
 - Hadron physics



Summary

- Post pandemic — now back to in-person meetings and visits. Significant delays and disruption
- Support for a number of further workshops in planning
- Visitor programmes for 2023 planned:
 - Senior academics
 - Early-stage researchers
- Budget under-spent at present — new travel plans
- New activity from experiences of online teaching — LaVA
- Connections with other disciplines actively developing