

# CRC-TR 211 Data Management Project Z02 Software Development Center



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## Introduction

- ▶ CRC-TR 211 „Strong-interaction matter under extreme conditions“ running since 2017 connects researchers at the universities in Frankfurt, Darmstadt, Bielefeld and Gießen
- ▶ Theoretical nuclear physics to understand the fundamental interactions of nature that build up matter in our universe
- ▶ Quarks and gluons interact to form hadrons, e. g. nucleons, the building blocks of matter
- ▶ The properties of QCD (quantum chromodynamics) are explored in terms of the phase structure and its transport properties
- ▶ Lattice QCD and effective theories, heavy-ion physics and cosmology in 14 projects on fundamental basics (A) and manifestations in nature (B)

## Challenges

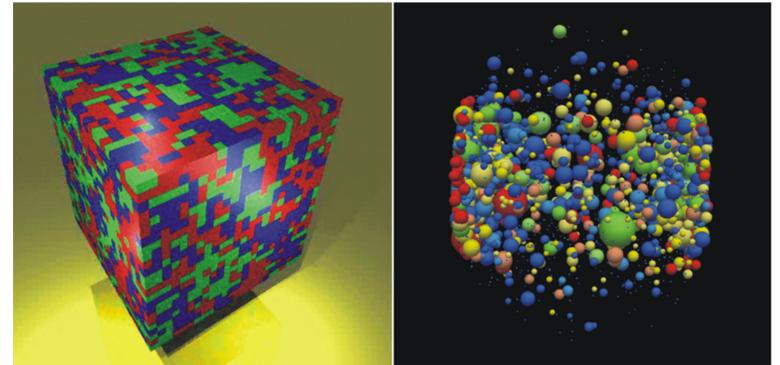
- ▶ Heterogeneous data sets and communities within CRC-TR 211
- ▶ Different levels of sensitivity of researchers/PI's to the subject
- ▶ Large data volumes (multiple TB's per file)
- ▶ International community has only partial standards

## Open Software

- ▶ Pedagogical Talk Series to inject this into the youngest members from the start
- ▶ Public software comes at a maintenance cost (not valued in terms of performance indicators for researchers)
- ▶ Versioning with git, public on Github/gitlab
- ▶ Structured reviewing and continuous integration for branches with feature development
- ▶ Unit tests and validation physics tests suite
- ▶ Zenodo for DOI for each version
- ▶ Ensure reproducibility, but risk of misuse of code

## Further Steps

- ▶ Maintain policy and ensure implementation
- ▶ Extend to include more elements and workflow
- ▶ Also analytic works need data management, storage of scanned hand-written notes of intermediate calculations
- ▶ Participation in PUNCH4NFDI consortium to establish a national data science platform for high energy particle, nuclear and astrophysics
- ▶ Extend the Pedagogical Talk Series



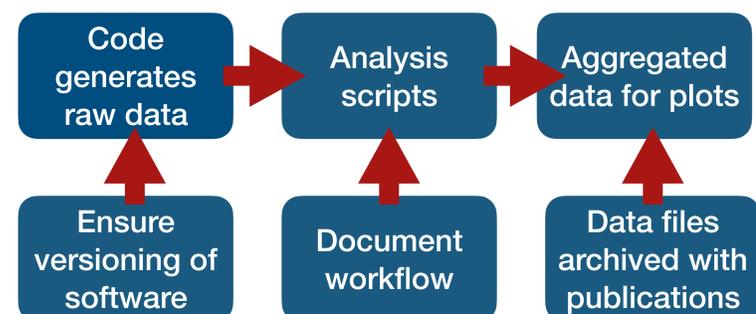
Visualization of lattice calculations and heavy-ion simulation

## Goals

- ▶ Fulfil the DFG Codex on Good Scientific Practice
- ▶ Application of FAIR principle to our data
- ▶ Ensure reproducibility over the timespan of individual members of CRC-TR 211
- ▶ Smooth integration in international community

## Data Management Policy

- ▶ Definition of „data“, clarification of responsibilities and specific rules for minimal set of data/metadata to be stored
- ▶ „data“ refers here to any result from research that cannot easily be reproduced, that includes software, notes on analytical calculations, scripts as well as actual raw and condensed data displayed in plots in publications
- ▶ PI's responsible for implementation, executive board responsible for information and sensibility of all members, Z02 offers technical support



## Implementation

- ▶ Thesis and publications are the sources of research data, corresponding authors are responsible for fulfilling the data management policy
- ▶ arXiv is well established and internationally used by all communities relevant for CRC-TR 211
- ▶ Directory structure „source“ with „figures“, „anc“ and „workflow“ is defined
- ▶ Redmine project management with attached git repositories at Bielefeld University allow for all levels of accessibility (public or private to small group of researchers in and outside CRC-TR)

## Contact

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