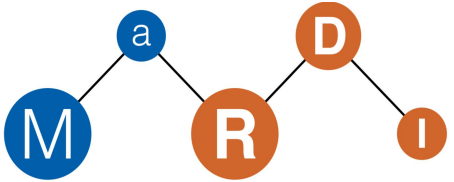
MATHREPO

MATHEMATICAL RESEARCH-DATA REPOSITORY

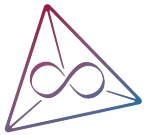


Tabea Bacher, Ben Hollering

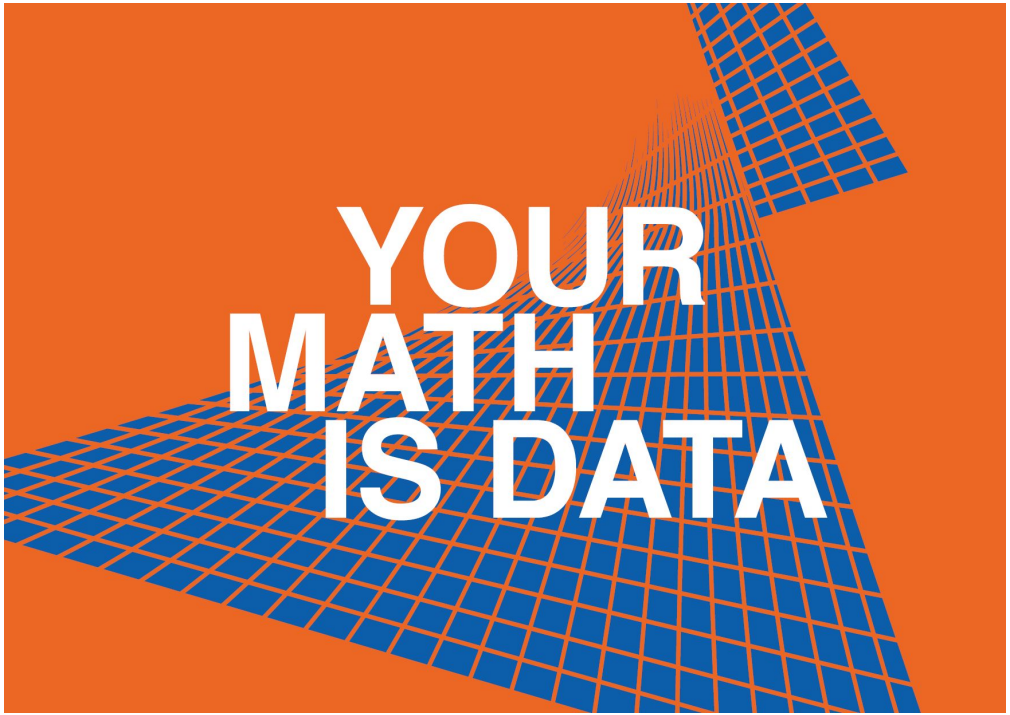
Nov 24th, 2022

MOM Workshop, Berlin

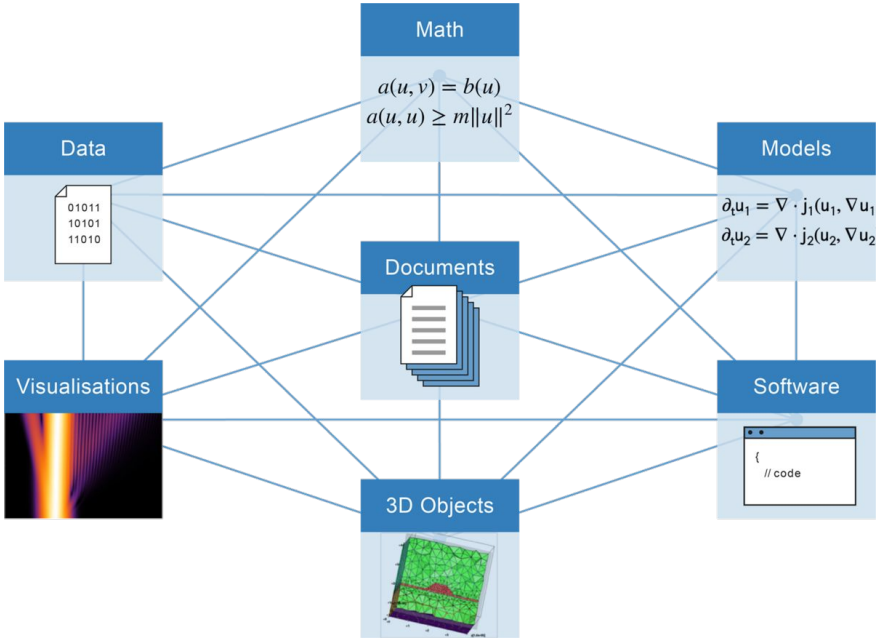
MAX-PLANCK-INSTITUT
FÜR MATHEMATIK
IN DEN NATURWISSENSCHAFTEN



What is research data?



What is research data?

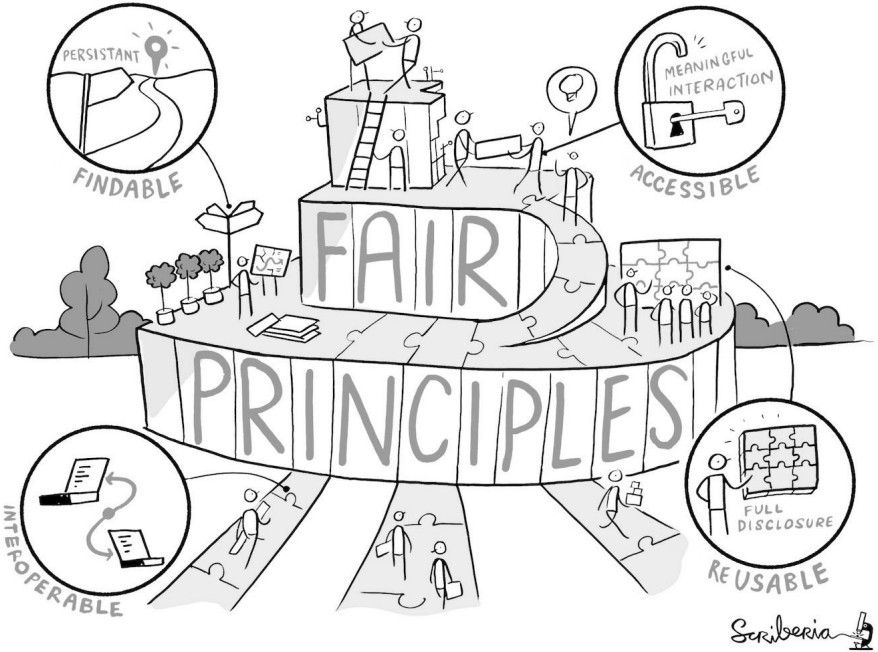


"We define research data as all digital and analog objects that are generated or handled in the process of doing research"*

developing services and guidelines/best practices for handling research data

* T.Boege, R. Fritze, C. Görgen et al. (2022) Research-Data Management Planning in the German Mathematical Community. arXiv:2211.12071 [math.HO]

How to handle research data



Mark Wilkinson, Michel Dumontier, IJsbrand Jan Aalbersberg, Gaby Appleton, et al. The FAIR guiding principles for scientific data management and stewardship. Scientific Data, 3(160018), 2016.

Where to store mathematical research data?

GitHub/GitLab

https://wissenschaftliche-integritaet.de/kommentare/software-entwicklung-und-umgang-mit-forschungsdaten-in-der-mathematik/

Where to store mathematical research data?

GitHub/GitLab

Versionsverwaltungsplattform GitLab plant wohl, inaktive Repositories zu löschen

Offenbar will das Unternehmen mit dem Löschen von Accounts, die länger als ein Jahr ohne Änderung sind, bis zu einer Million US-Dollar jährlich sparen.

heise.de 04.08.2022

https://wissenschaftliche-integritaet.de/kommentare/software-entwicklung-und-umgang-mit-forschungsdaten-in-der-mathematik/

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MathRepo

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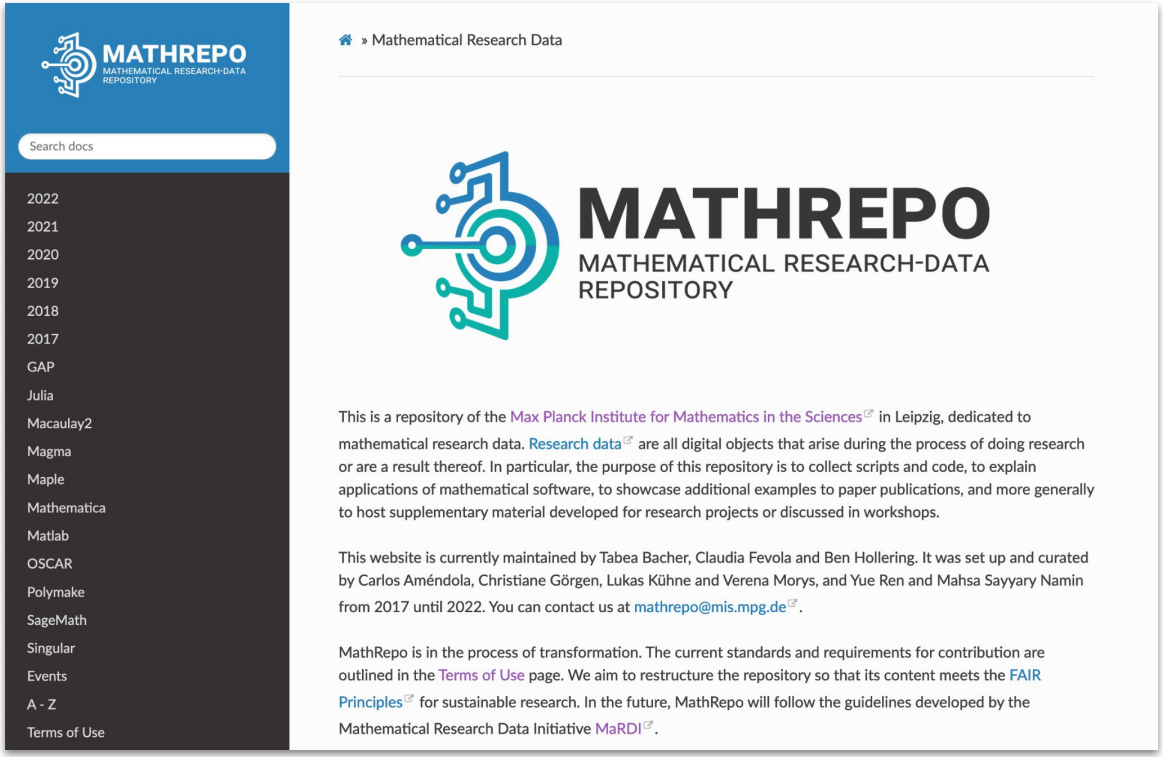
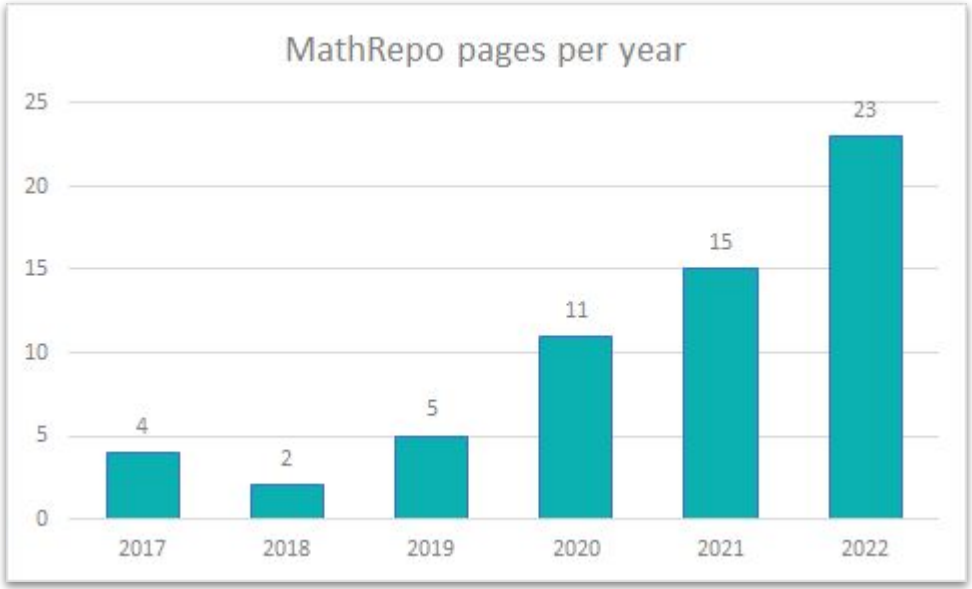
mathrepo.mis.mpg.de



mathrepo.mis.mpg.de

- run by the MPI MiS in Leipzig
- based on the institutes GitLab
- planned to be maintained at least for the next decade
- blog-style entries, high flexibility in how you display your content
- no hard quality control



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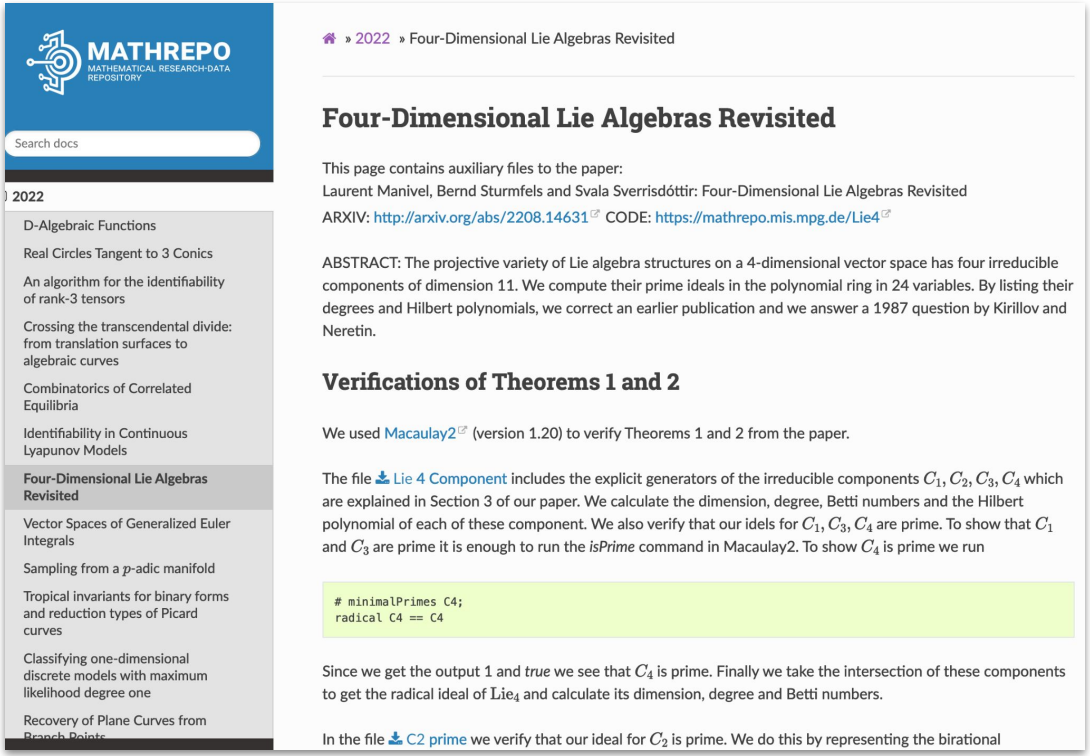

collected metadata:

- Project page created
- Project contributors
- Corresponding author of this page with email address
- Software used with version
- System setup used

eventually:

- Code written by
- Jupyter notebook written by
- Last updated

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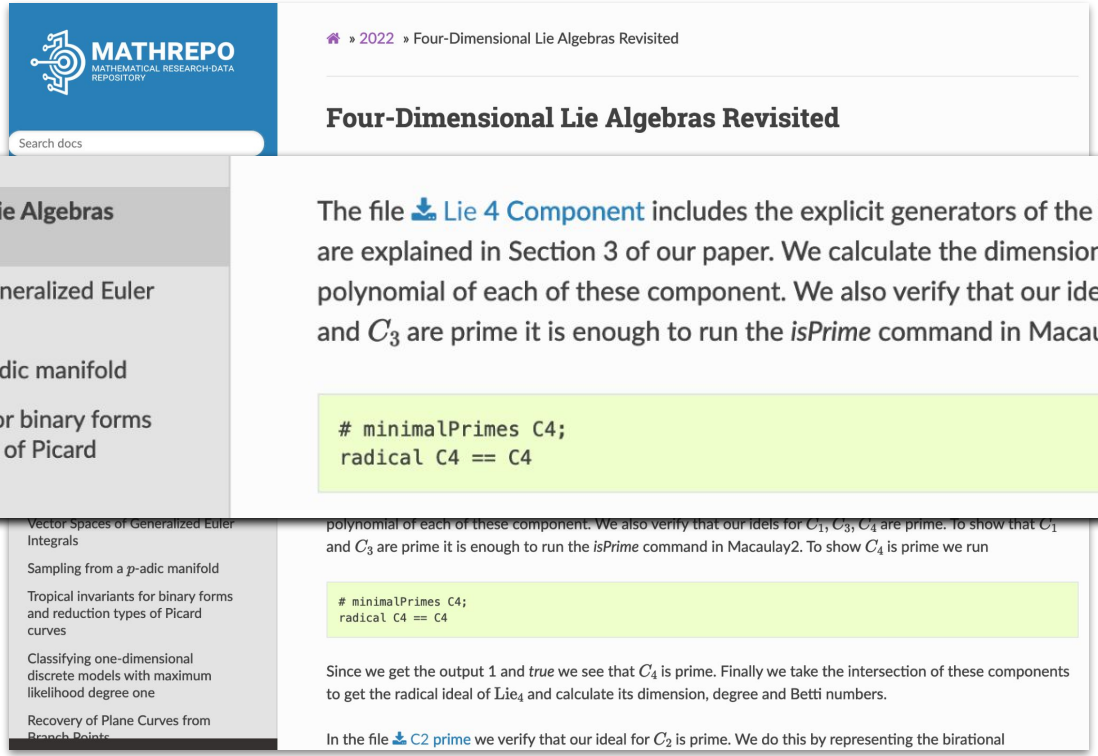

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MATHREPO
MATHEMATICAL RESEARCH-DATA REPOSITORY

Search docs

» 2022 » Four-Dimensional Lie Algebras Revisited

Four-Dimensional Lie Algebras Revisited

Lyapunov Models

Four-Dimensional Lie Algebras Revisited

Vector Spaces of Generalized Euler Integrals

Sampling from a p

Tropical invariants and reduction type curves

The file Lie 4 Component includes the explicit generators of the irreducible components C_1, C_2, C_3, C_4 which are explained in Section 3 of our paper. We calculate the dimension, degree, Betti numbers and the Hilbert polynomial of each of these component. We also verify that our idels for C_1, C_3, C_4 are prime. To show that C_1 and C_2 are prime it is enough to run the *isPrime* command in Macaulay2. To show C_4 is prime we run

Name	Last commit	Las
..		
C2prime.m2	Variety of 4 dimensional Lie algebras	2 mo
index.rst	arxiv link to Lie4	2 mo
lie4.m2	Variety of 4 dimensional Lie algebras	2 mo

How FAIR is MathRepo?

Findable

- ☑ URL stable for the foreseeable future
- ☑ findable in google search e.g.
- ☑ some metadata
- ☒ no DOI
- ☒ metadata is not indexed in a (machine-) searchable resource

Accessible

- ☑ no pay walls
- ☑ no sign-up process for readers
- ☑ low barrier for new contributions
- ☒ no automated retrieval of (meta) data

Interoperable

- ☑ maths with explanatory text, link to articles
- ☑ code annotated with software name, version, date, hardware setup
- ☒ very case specific, reproducibility might fail

Reusable

- ☑ author names for contact
- ☑ often a lot of detail provided
- ☒ no license information

C. Fevola and Ch. G. (2022). The mathematical research-data repository MathRepo. Computer Algebra Rundbrief, Nummer 70. Preprint on arxiv:2202.04022[math.HO].

Future Improvements

- Increase of user friendliness: "How to contribute" button on the main page
- more automation, less manual changes -> less mistakes
- for reusability: licenses

Future Improvements - Licenses

- Different types of data require different licenses -> mixed permissive licenses

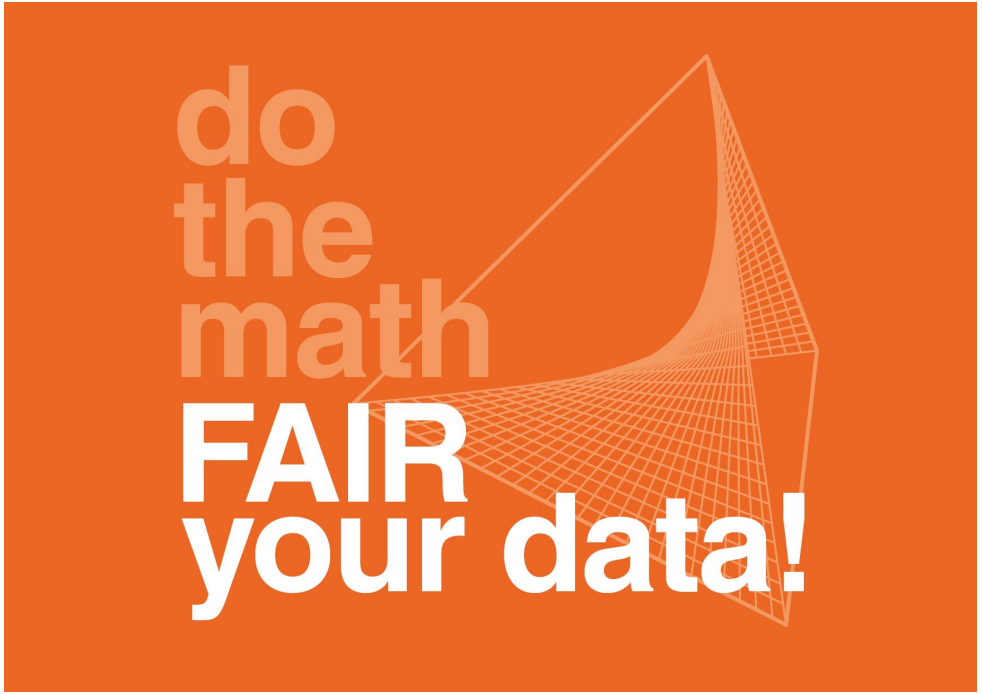
> MathRepo suggested license statement
>
> License for Code: MIT License (https://spdx.org/licenses/MIT.html)
>
> License for all other content (Text, Images, numerical data, …): Attribution 4.0 International (CC BY 4.0) https://creativecommons.org/licenses/by/4.0/

- next: add to template
- Any license is better than no license!

The Vision

- embedding into the MaRDI Portal
  - with Lars Kastner (TU Berlin)
  - automated extraction of metadata
  - upload to wikidata
- “launch your own MathRepo”
  - we can not provide a repository for everyone, but you can start your own MathRepo

The Vision



Nonlinear Algebra

Algebraic Geometry

Commutative Algebra

Group Theory

Differential Algebra

Combinatorics

Number Theory

Algebraic Topology

Discrete Geometry

Multilinear Algebra

Convex Geometry

Representation Theory

Computations

sage

julia

GAP 4

polymake

Macaulay2

Maple

SINGULAR

MAGMA

* Credit to Claudia Fevola for creating this slide

What Can You Do With MathRepo?

- Host Code
  - https://mathrepo.mis.mpg.de/correlated-equilibrium/index.html
- Visualization
  - https://mathrepo.mis.mpg.de/intersection-bodies/index.html
- Teaching
  - https://mathrepo.mis.mpg.de/ToricGeometry/index.html

Who is the FAIRest of them all?

Imaged by Heritage Auctions, HA.com

FAIREST MATHREPO PAGE 2022

Who is the FAIRest of them all?

The prize: fame and honor, 1kg of FAIR chocolate for the contributing team, a badge on the MathRepo Page

The criteria: Compliance with FAIR principles, good documentation and description, reproducible results

The jury: You!

The deadline: tomorrow at noon

https://t1p.de/usern