Plan Overview

A Data Management Plan created using DMPonline.be

Title: Deformed von Neumann algebras and isomorphism problems

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Template: FWO DMP (Flemish Standard DMP)

Project abstract:

Von Neumann algebras are a fundamental concept within the field of operator algebras. They arise through various procedures such as deformation phenomena ubiquitous in mathematical physics.

This research project focuses on isomorphism problems in a class of deformed von Neumann algebras, specifically the twisted Araki-Woods factors associated with certain Yang-Baxter type operators. These algebras, introduced just last year in full generality, are relatively unexplored. Their study is significant because they serve as a testing ground for von Neumann algebra questions in non-trivial contexts and offer insights into quantum field theory.

The primary objective is to investigate whether the twisted Araki-Woods factors remain isomorphic under changes in the deformation parameter. Given some exciting recent developments, now is an ideal time to delve into this topic. The project will employ rigorous methodologies in von Neumann algebras, exploring structural properties such as fullness, primeness, bi-exactness, absence of Cartan subalgebras, strong solidity, and various approximation properties.

This isomorphism problem falls under the larger umbrella of the classification program of non-hyperfinite factors, a major topic of research in the 21st century. The project will also allow us to revisit long-standing problems in operator algebras, such as the free-group factor conjecture, from a new angle.

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Deformed von Neumann algebras and isomorphism problems
FWO DMP (Flemish Standard DMP)

1. Research Data Summary

List and describe all datasets or research materials that you plan to generate/collect or reuse during your research project. For each dataset or data type (observational, experimental etc.), provide a short name & description (sufficient for yourself to know what data it is about), indicate whether the data are newly generated/collected or reused, digital or physical, also indicate the type of the data (the kind of content), its technical format (file extension), and an estimate of the upper limit of the volume of the data.

				Only for digital data	Only for digital data	Only for digital data	Only for physical data
Dataset Name	Description	New or reused	Digital or Physical	Digital Data Type	Digital Data format	Digital data volume (MB/GB/TB)	Physical volume
Notes	I will be writing notes during research meetings and during the preparation of final manuscripts	Generate new data	Both digital and physical	Other	.tex, .pdf, .bib, .docx	<1GB	A few sheets of paper
Manuscripts	Once 'Notes' have been refined for publications, they become a manuscript which contains my research findings	Generate new data	Both digital and physical	Other	.tex, .pdf, .bib, .docx	<1GB	N/A

If you reuse existing data, please specify the source, preferably by using a persistent identifier (e.g. DOI, Handle, URL etc.) per dataset or data type:

No data will be reused.

Are there any ethical issues concerning the creation and/or use of the data (e.g. experiments on humans or animals, dual use)? Describe these issues in the comment section. Please refer to specific datasets or data types when appropriate.

- No

Will you process personal data? If so, briefly describe the kind of personal data you will use in the comment section. Please refer to specific datasets or data types when appropriate.

- No

Does your work have potential for commercial valorization (e.g. tech transfer, for example spin-offs, commercial exploitation, …)? If so, please comment per dataset or data type where appropriate.

- No

Do existing 3rd party agreements restrict exploitation or dissemination of the data you (re)use (e.g. Material/Data transfer agreements/ research collaboration agreements)? If so, please explain in the comment section to what data they relate and what restrictions are in place.

- No

Are there any other legal issues, such as intellectual property rights and ownership, to be managed related to the data you (re)use? If so, please explain in the comment section to what data they relate and which restrictions will be asserted.

- No

2. Documentation and Metadata

Clearly describe what approach will be followed to capture the accompanying information necessary to keep data understandable and usable, for yourself and others, now and in the future (e.g., in terms of documentation levels and types required, procedures used, Electronic Lab Notebooks, README.txt files, Codebook.tsv etc. where this information is recorded).

While making the dataset 'Notes', I will label them with dates and topics, so that they are kept understandable for myself while I prepare for the dataset 'Manuscript'. Once the manuscript is produced, the notes will be less relevant as the manuscript will consist of self-contained and self-explained research work.

Will a metadata standard be used to make it easier to find and reuse the data? If so, please specify (where appropriate per dataset or data type) which metadata standard will be used. If not, please specify (where appropriate per dataset or data type) which metadata will be created to make the data easier to find and reuse.

- Yes

No metadata will be used for the dataset 'Notes'.
The dataset 'Manuscript' will contain both a list of keywords and the relevant codes of the 2020 Mathematics Subject Classification (MSC2020) to make the data easier to find and reuse.

3. Data storage & back-up during the research project

Where will the data be stored?

Physical notes will be stored in the desk drawer of my office in the Department of Mathematics at KU Leuven.
Digital notes are stored in the cloud based Latex editor *Overleaf.com*.
The Manuscripts will be uploaded to *arXiv.org*, an open-access repository for mathematical work, where the research article remains freely accessible indefinitely. They will further be deposited in *Lirias*, the institutional repository of KU Leuven, and submitted to journals for publication.

How will the data be backed up?

The digital dataset 'Notes' will be kept in the cloud editor *overleaf.com.*
Digital copies of the dataset 'Manuscript' will be kept on *overleaf.com*, on a local hard drive, personal *Dropbox* synced with overleaf, as well as *OneDrive* through KU Leuven.

Is there currently sufficient storage & backup capacity during the project? If yes, specify concisely.
If no or insufficient storage or backup capacities are available, then explain how this will be taken care of.

- Yes

There are enough space in my office for keeping the physical notes.
The digital dataset of 'Notes' and 'Manuscripts' will be of very small size (less than 1GB). The *OneDrive* account through KU Leuven allows for storage of 250 GB of files, while the maximum size of projects on *overleaf.com* is unlimited.

How will you ensure that the data are securely stored and not accessed or modified by unauthorized persons?

All digital data is stored in online accounts associated to me, which are password protected. All physical data is stored in my office desk drawer which is kept locked when not in use.

What are the expected costs for data storage and backup during the research project? How will these costs be covered?

No cost for data storage and backup.

4. Data preservation after the end of the research project

Which data will be retained for at least five years (or longer, in agreement with other retention policies that are applicable) after the end of the project? In case some data cannot be preserved, clearly state the reasons for this (e.g. legal or contractual restrictions, storage/budget issues, institutional policies...).

'Notes' will not be retained beyond the information transferred to the manuscripts.
'Manuscripts' will be retained on *arXiv.org, Lirias*, and the journal where they will be published for an indefinite time, beyond the five years after the project has ended.

Where will these data be archived (stored and curated for the long-term)?

'Notes' will not be archived.
'Manuscripts' will be retained on *arXiv.org, Lirias*, and the journal where they will be published.

What are the expected costs for data preservation during the expected retention period? How will these costs be covered?

No expected cost.

5. Data sharing and reuse

Will the data (or part of the data) be made available for reuse after/during the project? In the comment section please explain per dataset or data type which data will be made available.

- No (closed access)
- Yes, in an Open Access repository

No (closed access): The dataset 'Notes' will not be available as they are only for my personal use in order to write a manuscript.
Yes (in an Open Access repository): All of the dataset 'Manuscript' will be made available on the open access server *arXiv.org*, and the published manuscript will be available on *Lirias* and on the publishing journal.

If access is restricted, please specify who will be able to access the data and under what conditions.

The dataset 'Notes' will not be made available to the public, as it is for my personal use. However, all of the Notes data will be contained in a more refined form in the dataset 'Manuscript' which will be publicly available.

Are there any factors that restrict or prevent the sharing of (some of) the data (e.g. as defined in an agreement with a 3rd party, legal restrictions)? Please explain in the comment section per dataset or data type where appropriate.

- No

Where will the data be made available? If already known, please provide a repository per dataset or data type.

The dataset 'Manuscript' will be made available on the open access repository *arXiv.org*, and the published manuscript will be available on KU Leuven repository *Lirias* and on the publishing journal.

When will the data be made available?

The data 'Manuscript' will be first made publicly available by uploading them on *arXiv.org*.

Which data usage licenses are you going to provide? If none, please explain why.

License does not apply to the dataset 'Notes'.
'Manuscripts' on *arXiv.org* will be under "CC BY 4.0" license or under "arXiv.org perpetual, non-exclusive license to distribute this article".

Do you intend to add a PID/DOI/accession number to your dataset(s)? If already available, you have the option to provide it in the comment section.

- No

What are the expected costs for data sharing? How will these costs be covered?

No expected costs.

6. Responsibilities

Who will manage data documentation and metadata during the research project?

Manish Kumar

Who will manage data storage and backup during the research project?

Manish Kumar

Who will manage data preservation and sharing?

Manish Kumar

Who will update and implement this DMP?

Manish Kumar