FWO DMP Template - Flemish Standard Data Management Plan

Version KU Leuven

Project supervisors (from application round 2018 onwards) and fellows (from application round 2020 onwards) will, upon being awarded their project or fellowship, be invited to develop their answers to the data management related questions into a DMP. The FWO expects a **completed DMP no later than 6 months after the official start date** of the project or fellowship. The DMP should not be submitted to FWO but to the research co-ordination office of the host institute; FWO may request the DMP in a random check.

At the end of the project, the **final version of the DMP** has to be added to the final report of the project; this should be submitted to FWO by the supervisor-spokesperson through FWO's e-portal. This DMP may of course have been updated since its first version. The DMP is an element in the final evaluation of the project by the relevant expert panel. Both the DMP submitted within the first 6 months after the start date and the final DMP may use this template.

The DMP template used by the Research Foundation Flanders (FWO) corresponds with the Flemish Standard Data Management Plan. This Flemish Standard DMP was developed by the Flemish Research Data Network (FRDN) Task Force DMP which comprises representatives of all Flemish funders and research institutions. This is a standardized DMP template based on the previous FWO template that contains the core requirements for data management planning. To increase understanding and facilitate completion of the DMP, a standardized **glossary** of definitions and abbreviations is available via the following link.

1. General Project Information	
Name Grant Holder & ORCID	**Joris Van de Vondel (https://orcid.org/0000-0001-6894-7258)**
Contributor name(s) (+ ORCID) & roles	**Kristiaan Temst (https://orcid.org/0000-0002-1377-5097)**
Project number [1] & title	**G0D7723N**
Funder(s) GrantID [2]	
Affiliation(s)	☒ KU Leuven ☐ Universiteit Antwerpen ☐ Universiteit Gent ☐ Universiteit Hasselt ☐ Vrije Universiteit Brussel ☐ Other: ROR identifier KU Leuven: 05f950310

[1] "Project number" refers to the institutional project number. This question is optional. Applicants can only provide one project number.

[2] Funder(s) GrantID refers to the number of the DMP at the funder(s), here one can specify multiple GrantIDs if multiple funding sources were used.

Please provide a short project description	Superconductor/ferromagnet hybrids are a promising platform for various spin-based applications. In the non-dissipative ground state of a superconductor electrons combine in so-called Cooper pairs, i.e. two electrons with opposite spin orientation allowing the maximization of their phonon-mediated attraction. Unfortunately, this compensated spin configuration is not beneficial for spin information propagation in superconductors. However, at finite temperatures elementary excitations (quasiparticles) behaving as chargeless fermions enable efficient transmission of pure spin information with extremely long lifetimes. Interfacing the superconductor with a ferromagnetic material permits the transformation of spin-singlet (S=0, no spin transport possible) into spin-triplet (S=1, possible spin transport) pairs and the creation of a spin-triplet lossless supercurrent. Thus far, most investigations have addressed the spin transport in conventional superconductor/ferromagnet hybrids. In this research project, the KUL and ULg team will tackle a variety of very interesting questions regarding the origin and lifetime of the spin carriers and how one can achieve efficient spin pumping using a variety of novel superconducting and ferromagnetic hybrid devices. More precisely, we will focus on complex oxides that exhibit unique advantages including epitaxial stacking and consequently high transparency for spin transport, a high superconducting critical temperature technologically attractive for potential operational devices, and a wealth of unconventional coupled electronic and structural phases. This project aims to have a long-term impact by opening up unique new opportunities to control the magnetization dynamics in these hybrid structures for spintronic applications such as quantum computing and pi-Josephson junctions.

2. 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 [3].

				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
Experimental data -measurements	Resulting cryogenic transport measurements (AC-DC) Mössbauer spectroscopy data Nuclear resonant scattering data obtained at synchrotrons (DESY, ESRF) Neutron scattering data obtained at	☒ Generate new data ☐ Reuse existing data	☒ Digital ☐ Physical	☒ Audiovisual ☐ Images ☐ Sound ☒ Numerical ☐ Textual ☐ Model ☐ Software ☐ Other:	.csv & .txt .csv .mca, .mcadat, .spec, .fio .mft	☐ < 1 GB ☐ < 100 GB ☒ < 1 TB ☐ < 5 TB ☐ > 5 TB ☐ NA	

[3] Add rows for each dataset you want to describe.

	neutron source (ILL)						
Measurement software	Developed measurement software (Python)	☒ Generate new data ☐ Reuse existing data	☒ Digital ☐ Physical	☐ Audiovisual ☐ Images ☐ Sound ☐ Numerical ☐ Textual ☐ Model ☒ Software ☐ Other:	. py	☐ < 1 GB ☒ < 100 GB ☐ < 1 TB ☐ < 5 TB ☐ > 5 TB ☐ NA	
Samples	Fabricated and measured samples	☒ Generate new data ☐ Reuse existing data	☐ Digital ☒ Physical	☐ Audiovisual ☐ Images ☐ Sound ☐ Numerical ☐ Textual ☐ Model ☐ Software ☐ Other:		☐ < 1 GB ☐ < 100 GB ☐ < 1 TB ☐ < 5 TB ☐ > 5 TB ☒ NA	In order to fit our system the size will be around (7 x 4 X 0.5 mm^3). During the whole project less than 100 samples will be fabricated.
Samples design	Code to generate designs for lithography	☒ Generate new data ☐ Reuse existing data	☒ Digital ☐ Physical	☐ Audiovisual ☐ Images ☐ Sound ☐ Numerical ☐ Textual ☐ Model ☒ Software ☐ Other:	.py & .gds	☐ < 1 GB ☒ < 100 GB ☐ < 1 TB ☐ < 5 TB ☐ > 5 TB ☐ NA	

GUIDANCE: *The data description forms the basis of your entire DMP, so make sure it is detailed and complete. It includes digital and physical data and encompasses the whole spectrum ranging from raw data to processed and analysed data including analysis scripts and code. Physical data are all materials that need proper management because they are valuable, difficult to replace and/or ethical issues are associated. Materials that are not considered data in an RDM context include your own manuscripts, theses and presentations; documentation is an integral part of your datasets and should described under documentation/metadata.* *RDM Guidance on data*	
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.	Not applicable
Are there any ethical issues concerning the creation and/or use of the data (e.g. experiments on humans or animals, dual use)? If so, refer to specific datasets or data types when appropriate and provide the relevant ethical approval number.	☐ Yes, human subject data; provide SMEC or EC approval number: ☐ Yes, animal data; provide ECD reference number: ☐ Yes, dual use; provide approval number: ☒ No Additional information:
Will you process personal data[4]? If so, please refer to specific datasets or data types when appropriate and provide the KU Leuven or UZ Leuven privacy register number (G or S number).	☐ Yes (provide PRET G-number or EC S-number below) ☒ No Additional information:
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.	☐ Yes ☒ No If yes, please comment:

[4] See Glossary Flemish Standard Data Management Plan

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 to what data they relate and what restrictions are in place.	☐ Yes ☒ No If yes, please explain:
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 to what data they relate and which restrictions will be asserted.	☐ Yes ☒ No If yes, please explain:

3. 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). *RDM guidance on documentation and metadata*.	The following structure will be followed (all this data is saved on the shared folder, see point 4.): • Each researcher involved will have one Excel .csv labeled Sample_log_name, this document is the overview of all data (and can be used to track everything), it includes the measurement date, sample label, material properties, and most important findings. • For every sample the measurement data and interpretation/comments/thoughts are combined in a PowerPoint (pptx), the full path location of the data shown in the PowerPoint is included. The PowerPoint is labeled Data_overview_SampleName_date.pptx • Similarly the fabrication step are combined in presentation, including picture, recipes and followed protocols. The PowerPoint are labeled Fabrication_SampleName_date.pptx • The sample designs (.gds) and code to generate this design are stored in folder labeled Sampled_name_ready_for_ebeam. Each folder contain three separate folders Top, Middle, and Bottom indicating the design used at the specific position. • All experimental fabrication steps, e.g. MBE, PLD, ebeam are additionally logged in a physical logbook present at the tool, which will remain present at the tool at all time. • All data that are collected at international research infrastructures (in particular synchrotron x-ray and neutron sources) are documented and logged in digital way and noted down in a physical logbook at these facilities. A copy of the relevant pages in that logbook is made and carried to the laboratory by the researchers who carry out these experiments.

Will a metadata standard be used to make it easier to **find and reuse the data**? If so, please specify which metadata standard will be used. If not, please specify which metadata will be created to make the data easier to find and reuse. *REPOSITORIES COULD ASK TO DELIVER METADATA IN A CERTAIN FORMAT, WITH SPECIFIED ONTOLOGIES AND VOCABULARIES, I.E. STANDARD LISTS WITH UNIQUE IDENTIFIERS.*	☐ Yes ☒ No If yes, please specify (where appropriate per dataset or data type) which metadata standard will be used: If no, please specify (where appropriate per dataset or data type) which metadata will be created: As mentioned in the previous point

4. Data Storage & Back-up during the Research Project	
Where will the data be stored? *Consult the interactive KU Leuven storage guide to find the most suitable storage solution for your data.*	☐ Shared network drive (J-drive) ☒ Personal network drive (I-drive) ☐ OneDrive (KU Leuven) ☐ Sharepoint online ☐ Sharepoint on-premis ☐ Large Volume Storage ☐ Digital Vault ☒ Other: data obtained at international research infrastructures are also stored at the facility (and remain available for online access)

How will the data be backed up? *WHAT STORAGE AND BACKUP PROCEDURES WILL BE IN PLACE TO PREVENT DATA LOSS?*	☐ Standard back-up provided by KU Leuven ICTS for my storage solution ☐ Personal back-ups I make (specify) ☒ Other (specify) All experimental data will be stored on the Network drives provided on site at the department (smb or nfs protocol), the system consists of two backup systems. The drive is backed up daily, and deleted folders/files can be recovered up to 64 snapshots. Secondly, this is with a 30-day retention policy, which means we can restore deleted or previous versions of our files up to 30 days in the past. This backup is physically on another server to prevent data loss in case of hardware failures of the main fileserver. The documentation mentioned in point 3 is also stored on our Network drive, moreover locally on my department laptop and personal hard drive (weekly). Data obtained at international research infrastructures are stored and backed up at that facility on large storage devices. Physical samples are placed in sample boxes and labelled as described in the overview dataset. The volatile samples will be kept secure in our available vacuum pots (capacity of around 800 samples, present in our lab), while the robust samples are stored under ambient conditions in my personal office space. However, the storage of fabricated samples is not always as useful as conceived. Some samples degrade over time or are destroyed purely by the removal process inherent to our cryostats.
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 ☐ No If no, please specify:

How will you ensure that the data are securely stored and not accessed or modified by unauthorized persons? *CLEARLY DESCRIBE THE MEASURES (IN TERMS OF PHYSICAL SECURITY, NETWORK SECURITY, AND SECURITY OF COMPUTER SYSTEMS AND FILES) THAT WILL BE TAKEN TO ENSURE THAT STORED AND TRANSFERRED DATA ARE SAFE.* *Guidance on security for research data*	To gain access to the network drives, one need to go through a process initiated by our ICT responsible and be KULeuven/physics associated. The only way to access is through our personal department laptop or lab desktop.
What are the expected costs for data storage and backup during the research project? How will these costs be covered?	No additional resources are needed, covered by our department/KULeuven.

5. 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...). *Guidance on data preservation*	☒ All data will be preserved for 10 years according to KU Leuven RDM policy ☐ All data will be preserved for 25 years according to CTC recommendations for clinical trials with medicinal products for human use and for clinical experiments on humans ☐ Certain data cannot be kept for 10 years (explain)

Where will these data be archived (stored and curated for the long-term)? *Dedicated data repositories are often the best place to preserve your data. Data not suitable for preservation in a repository can be stored using a KU Leuven storage solution, consult the interactive KU Leuven storage guide.*	☐ KU Leuven RDR ☐ Large Volume Storage (longterm for large volumes) ☒ Shared network drive (J-drive) ☐ Other (specifiy):
What are the expected costs for data preservation during the expected retention period? How will these costs be covered?	No additional resources are needed, covered by our department/KULeuven, personal.

6. Data Sharing and Reuse	
Will the data (or part of the data) be made available for reuse after/during the project? Please explain per dataset or data type which data will be made available. *NOTE THAT 'AVAILABLE' DOES NOT NECESSARILY MEAN THAT THE DATA SET BECOMES OPENLY AVAILABLE, CONDITIONS FOR ACCESS AND USE MAY APPLY. AVAILABILITY IN THIS QUESTION THUS ENTAILS BOTH OPEN & RESTRICTED ACCESS. FOR MORE INFORMATION: HTTPS://WIKI.SURFNET.NL/DISPLAY/STANDARDS/INFO-EU-REPO/#INFOEUREPO-ACCESSRIGHTS*	☐ Yes, as open data ☐ Yes, as embargoed data (temporary restriction) ☐ Yes, as restricted data (upon approval, or institutional access only) ☐ No (closed access) ☒ Other, please specify: Data used in a publication will not be placed online in a repository, but is stored on our network drives accessible by all our team members. The data that support the plots of our papers and other findings within our studies are available upon reasonable request.

If access is restricted, please specify who will be able to access the data and under what conditions.	Not applicable, data is accessible upon reasonable request.
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 per dataset or data type where appropriate.	☐ Yes, privacy aspects ☐ Yes, intellectual property rights ☐ Yes, ethical aspects ☐ Yes, aspects of dual use ☐ Yes, other ☒ No If yes, please specify:
Where will the data be made available? If already known, please provide a repository per dataset or data type.	☐ KU Leuven RDR ☐ Other data repository (specify) ☒ Other (specify) See description above.
When will the data be made available?	☐ Upon publication of research results ☐ Specific date (specify) ☒ Other (specify) See description above.

Which data usage licenses are you going to provide? If none, please explain why. *A DATA USAGE LICENSE INDICATES WHETHER THE DATA CAN BE REUSED OR NOT AND UNDER WHAT CONDITIONS. IF NO LICENCE IS GRANTED, THE DATA ARE IN A GREY ZONE AND CANNOT BE LEGALLY REUSED. DO NOTE THAT YOU MAY ONLY RELEASE DATA UNDER A LICENCE CHOSEN BY YOURSELF IF IT DOES NOT ALREADY FALL UNDER ANOTHER LICENCE THAT MIGHT PROHIBIT THAT.* *Check the RDR guidance on licences for data and software sources code or consult the License selector tool to help you choose.*	☐ CC-BY 4.0 (data) ☐ Data Transfer Agreement (restricted data) ☐ MIT licence (code) ☐ GNU GPL-3.0 (code) ☒ Other (specify) no reuse of data.
Do you intend to add a PID/DOI/accession number to your dataset(s)? If already available, please provide it here. *INDICATE WHETHER YOU INTEND TO ADD A PERSISTENT AND UNIQUE IDENTIFIER IN ORDER TO IDENTIFY AND RETRIEVE THE DATA.*	☐ Yes, a PID will be added upon deposit in a data repository ☐ My dataset already has a PID ☒ No
What are the expected costs for data sharing? How will these costs be covered?	**No costs**

7. Responsibilities	
Who will manage data documentation and metadata during the research project?	All researchers involved under the supervision of the promoters of the project.
Who will manage data storage and backup during the research project?	All researchers involved under the supervision of the promoters of the project.
Who will manage data preservation and sharing?	All researchers involved under the supervision of the promoters of the project.
Who will update and implement this DMP?	All researchers involved under the supervision of the promoters of the project.