

Open science practices in Majorana research



André Melo (am@andremelo.org)

Sebastian Rubbert

Anton Akhmerov



**Quantum
Tinkerer**

Open science practices in Majorana research

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Who am I?

Physics PhD student at TU Delft. I use computer simulations to study quantum devices.

I will talk about open science practices in one of our papers:

- Why we published in a cool open science journal
- How we shared our code
- How we got feedback on how to improve

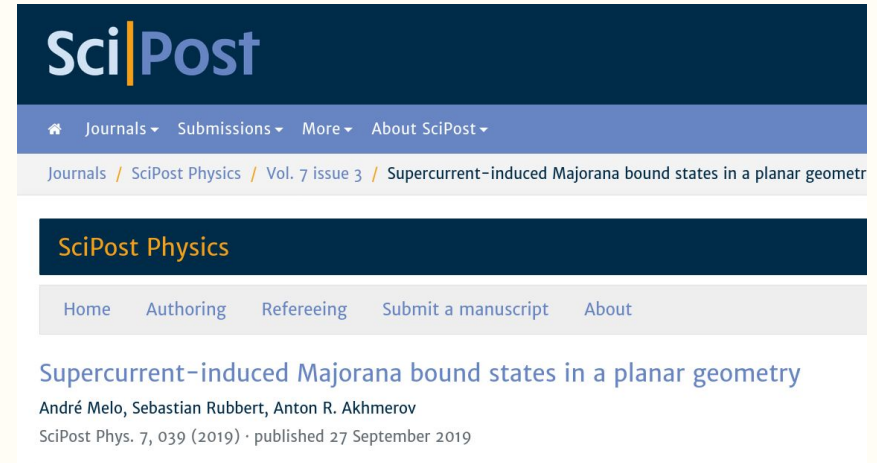
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Publishing: SciPost

- No paywalls to publish or read
- Non-profit + run by active scientists
- Peer-witnessed refereeing
- Expanding to Mathematics, Biology, Chemistry and Astronomy.

Challenges: still lacking brand name of more established journals.



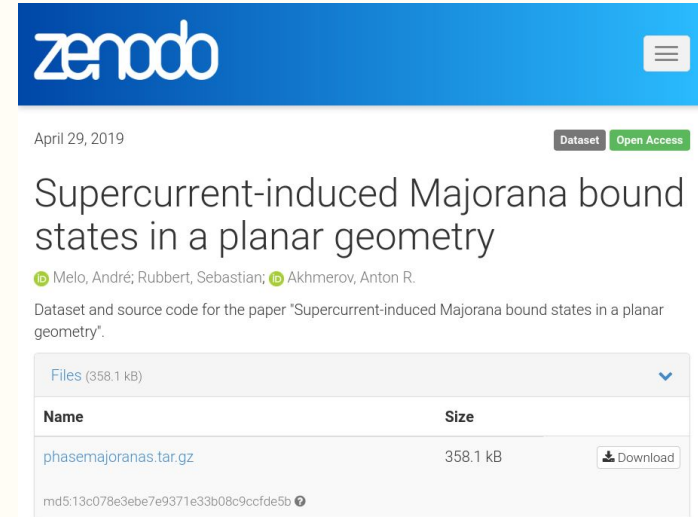
The screenshot displays the SciPost website interface. At the top, the SciPost logo is visible in white and blue. Below the logo is a navigation bar with links for Journals, Submissions, More, and About SciPost. The main content area shows the breadcrumb trail: Journals / SciPost Physics / Vol. 7 issue 3 / Supercurrent-induced Majorana bound states in a planar geometry. Below this, the SciPost Physics logo is displayed in orange. A secondary navigation bar includes links for Home, Authoring, Refereeing, Submit a manuscript, and About. The article title, 'Supercurrent-induced Majorana bound states in a planar geometry', is shown in blue, followed by the authors' names: André Melo, Sebastian Rubbert, Anton R. Akhmerov. At the bottom, the publication information is listed: SciPost Phys. 7, 039 (2019) · published 27 September 2019.

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Sharing code: Zenodo

- Open access repository of code/datasets operated by CERN
- Submissions get a DOI: **easy to find and cite!**
- Integrates with Github, usage statistics and versioning



The screenshot shows the Zenodo interface for a dataset. At the top, the Zenodo logo is on the left and a menu icon is on the right. Below the logo, the date 'April 29, 2019' is displayed. To the right of the date are two buttons: 'Dataset' and 'Open Access'. The main title of the dataset is 'Supercurrent-induced Majorana bound states in a planar geometry'. Below the title, the authors are listed: 'Melo, André; Rubbert, Sebastian; Akhmerov, Anton R.'. A short description follows: 'Dataset and source code for the paper "Supercurrent-induced Majorana bound states in a planar geometry"'. Below the description is a table of files. The table has two columns: 'Name' and 'Size'. There is one file listed: 'phasemajoranas.tar.gz' with a size of '358.1 kB'. To the right of the file name is a 'Download' button. Below the table, the MD5 hash 'md5:13c078e3ebe7e9371e33b08c9ccfde5b' is shown.

zenodo

April 29, 2019

Dataset Open Access

Supercurrent-induced Majorana bound states in a planar geometry

Melo, André; Rubbert, Sebastian; Akhmerov, Anton R.

Dataset and source code for the paper "Supercurrent-induced Majorana bound states in a planar geometry".

Name	Size
phasemajoranas.tar.gz	358.1 kB

md5:13c078e3ebe7e9371e33b08c9ccfde5b

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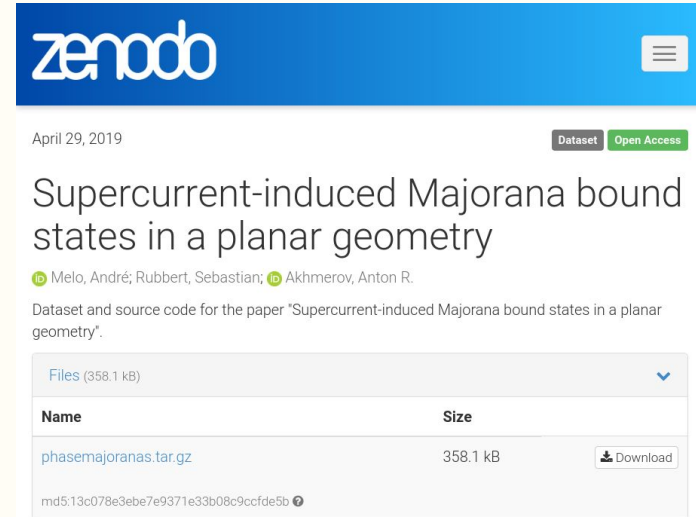
Sharing code: Zenodo

Cool outcomes:

- Other groups using our code and extending results
- No time wasted reproducing old results in follow-up projects

Challenges:

- Sharing code can be intimidating
- Writing clean, reproducible code takes extra effort
(but it's worth it!)



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Name	Size
phasemajoranas.tar.gz	358.1 kB

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Improving our code: Reprohack

- Participants attempt to reproduce a paper with publicly available code and data
- At the end participants regroup, share experiences and **give feedback to the authors.**

ReproHack



ReproHack @ Leiden University

A hands-on Reproducibility Hackathon

 30th November, 2019

 10 am - 5pm

 Leiden University Library

 Witte Singel 27, 2311 BG Leiden

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Improving our code: Reprohack

Cool outcomes:

- Extremely valuable feedback
- People from different countries and scientific backgrounds reproduced the results in our paper! :-)

Challenges:

- Somewhat scary! **But:** response from participants is overwhelmingly positive and constructive.



Sander
@sjvrijn

Just finished reproducing the figures from a paper by [@_andrenmelo](#) at the [@ReproHackNL](#) together with [@PhDToothFAIRy!](#)

2:56 PM · Nov 30, 2019 · [Twitter Web App](#)

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Take home messages: sharing code

Takes extra time and effort	<ul style="list-style-type: none">→ Start follow up projects much quicker→ Research with more confidence
May require learning new skills <i>(git, unit testing, etc)</i>	<ul style="list-style-type: none">→ Much easier with time→ Applicable in many contexts!
Is somewhat scary!	<ul style="list-style-type: none">→ Start small: e.g. share just your data→ Response from researchers tends to be overwhelmingly positive

Thank you!

<https://quantumtinkerer.group>

<https://andremelo.org>

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