PRL+SM and arXiv submission guide

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1 Scope of this document

1.1 Problem addressed

You are intending to submit a manuscript (Letter) to the APS journal *Physical Review Letters* (PRL) with additional Supplementary Material (SM). At the same time, you wish to make your work publicly available on `https://arxiv.org` (arXiv). Both PRL and arXiv generate a `.pdf` from raw files you submit: a main TEX document `main.tex` and a compiled bibliography (`main.bbl`). The difference is that for PRL `main.tex` must contains the content of the Letter (manuscript) only—SM is submitted as a separate `.pdf` which you must generate locally—whereas for arXiv it should contain both the Letter and SM.

This document provides an efficient workflow to produce the files for a PRL-arXiv submission. A critical problem solved is how to generate a SM `.pdf` for PRL with references to both items in the Letter and the SM itself, and with *active hyperlinks in the case the item is in the SM,* while at the same time preserving the correct bibliography structure (PRL requires the Letter's reference list includes articles cited in both the Letter and the SM). While I only refer to PRL specifically, submission to other APS journals is likely to be very similar, and may not have the complication of having separate SM (e.g. included as Appendices).

You shouldn't refer to this document if... You want a simple solution and aren't bothered by not having working hyperlinks for SM items in your SM `.pdf`. In that case, the easiest thing to do is to compile the entire document (resetting the page numbering for the SM perhaps) and simply extract the SM pages to a separate `.pdf`. To create the Letter `.tex`, simply remove all the SM text (you may need to make dummy `cites` to ensure the Letter bibliography contains all references).

1.2 What I would like to add to this document (todos)

- Guide to using the APS submission widget including section, header choices
- Guide to using the arXiv submission widget, plus considerations of submission timing, authorship
- updating an arXiv submission

2 Writing the manuscript

The basic structure we will be working from is a single `main.tex` containing the Letter (manuscript) and SM separated by a page break. See `prl_template.tex` for a basic template that may be used to create a `revtex-4.2` (the APS/AIP article class) document in this format—it shouldn't be difficult to adjust or merge your own files if you've already written up in a different way.

Whilst writing the manuscript you will want to bear in mind the Physical Review style guide and word count limits. There is also an author's guide for the `revtex` class.

3 Preparation

Suppose we are in a directory containing our paper files:

```
paper_files/
    - main.tex
    - refs.bib
    - fig1.pdf
    - fig2.pdf
    - figSM1.pdf
    - figSM2.pdf
```

where `main.tex` is the manuscript plus SM, `refs.bib` the bibliography used by the main file (`bibliographyrefs.bib`) and `fig1.pdf`, `fig2.pdf` (`figSM1.pdf`, `figSM2.pdf`) figures used in the manuscript (SM). Note when submitting to PRL and arXiv all files must reside in the same (top-level) directory, so you can't e.g. use a `figures/` subdirectory containing all four figures.

Since we will submit the `.tex` directly, it is a good idea to clean up `main.tex` by removing any comments or unused code (this file will be publicly accessible via 'Download Source' on arXiv). Once you think your manuscript content is ready to make a submission (or re-submission), compile `main.tex` as you normally would i.e. running both a LaTeX compiler and BIBTeX program. *Check the output* `main.pdf` in case anything broke whilst you were removing commens etc. (we will be checking the output a lot).

From the files produced we will need `main.aux` and `main.bbl`, in addition to `main.tex` and any figure/data files required by `main.tex` (all other files can be left as they are). We will also need the scripts `parse_main_aux.py` and `select_links.py` to generate the SM. Create two new subdirectories `paper` and `supp` with

```
paper_files/paper/
    - main.tex
    - main.bbl
    - fig1.pdf, fig2.pdf # ANY figures/data used in main text (Letter)
paper_files/supp/
    - main.tex
    - main.aux
    - figSM1.pdf, figSM2.pdf # ANY figures/data used in SM
- parse_main_aux.py, select_links.py # helper scripts
```

4 Generating manuscript (paper) files for PRL

Move into `paper_files/paper` (`cd paper`) and edit `main.tex`:

- Remove *all* SM text (content *between* `\biliography{refs.bib}` and `\end{document}`)
- Replace `\biliography{refs.bib}` with `\input{main.bib}`
- Remove the `\}` arXiv command

The document should now be compiled *twice* using LaTeX only i.e. not BIBTeX. Since most editors will try to run BIBTeX automatically, I recommend doing this from the command line:

```
$ pdflatex main.tex && pdflatex main.tex
```

Two compilations are needed to get hyperlinks working. *Check the output* `main.pdf`. This should have the Letter with all hyperlinks (refs/cites) present and functional.

`main.tex`, `main.bbl` and any Letter figures/data are now ready to be uploaded to the APS submission server (todo: details on submission server UI). The following command creates a tarball `upload.tar` that can be uploaded directly:

```
$ tar -cvf upload.tar main.tex main.bbl fig1.pdf fig2.pdf
```

Do *not* include `main.pdf` or other auxiliary files produced when you ran `pdflatex`.

5 Generating SM (supp) for PRL

Move into `paper_files/supp` and edit `main.tex`:

- Remove *all* Letter text (content *after* `\begin{document}` up to and including `\bibliography{refs.bib}\clearpage`)

Now run `parse_main_aux.py main.aux` to produce `out.aux`. This removes any link that isn't a `\citation`, `\newlabel` or `\bibcite` commands (it also removes all commands corresponding to SM labels/citations). This is done to preserve references in the final SM `.pdf`. This list of commands is almost certainly incomplete, so you may find we need to add others (let me know). Once we think this ran successfully (or would like to test it), rename `out.tex` to `labels.aux`.

Next run `select_links.py main.tex` to produce `out.tex`. This script finds commands e.g. `\cite{kubo1962}`, `\eqref{eq:1}` that reference labels from the Letter, and wraps these references with a command `\nolink` (defined below) which suppresses the creation of a clickable link for these elements. The point is in the final SM we want to be click references to items (equations,

figures etc.) in the SM itself, but not items in the Letter. This is done using regular expressions (Python `re`), and will almost certainly not work perfectly the first time you use it given the variety of commands available to references in a LaTeX document: `\cite{}`, `\Cite{}`, `\ref{}`, `\eqref{}`, `\cref{}`, `\Cref{}`, should certainly all work, but get in touch with me to fix the script for your use case. Once things look to be working (or we want to test whether they are), rename `out.tex` to `supp.tex`.

Finally, edit `supp.tex` and immediately *above* `\begin{document}` add

```
\input{labels.aux} % file generated by parse_main_aux.py
\newcommand*{\nolink}[1]{%
  {\protect\NoHyper#1\protect\endNoHyper}%
}
```

Do a double LaTeX compilation of `supp.tex`:

```
$  pdflatex supp.tex && pdflatex supp.tex
```

If everything worked, `supp.pdf` should contain SM with all references present, but only those referencing items in the SM itself featuring an active link (you may chose to disable the link colour by passing `[colorlinks=false]` or `[hidelinks]` options to the `hyperref` package in the preamble. `supp.pdf` can now be uploaded as it's own document using the APS submission widget (alongside the files uploaded in the previous section).

6 arXiv submission

This process is far simpler as our main file has the format we want for arXiv already. Create a directory `paper_files/arxiv` and copy `main.tex`, `main.bbl` and *all* (Letter plus SM) figures/data files there. Now simply create a single tarball which can be directly uploaded to arXiv:

```
$ cd arxiv
$ tar -cv upload.tar *
```

A more detailed guide is available at https://trevorcampbell.me/html/arxiv.html.