

ex2-Probe-class

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1 Example 2: The mm2SANS Probe class

The Probe class describes all settings specific to a particular SANS experiment.

Most importantly, it combines the properties of Detector (specifying size and layout of the SANS detector) and Beamline (setting neutron wavelength, neutron polarisation, and orientation of coordinate systems) objects to calculate the q -map, as well as the neutron polarisation \vec{P} within the beamline coordinate system U, V, W .

To specify the rotations of the sample and the sample environment the the fields `Probe.Beamline.sample_rotations` and `probe.Beamline.sample_environment_rotations`, respectively, are used. As this is a headache on its own, find details and explanations in the corresponding example notebook.

1.1 Things you can do with a Probe object

- Modify the \vec{Q} map, e.g. select a region of interest or thin out the values to evaluate in order to execute the code faster.
- You can also set up a log-scale \vec{Q} map using the `Detector.calc_log_qmap` function. Note that it does not make sense to go to q ranges that correspond to distances lower than the mean distance in your real-space mesh, though.
- Vary the sample or sample environment orientation, and re-calculate the transformation matrices. This allows to e.g. simulate rocking curves.

```
[1]: import mm2SANS
```

```
[2]: probe = mm2SANS.Probe(  
        sans_instrument='test'  
        , neutron_wavelength=6e-10 # in m  
        , detector_distance=15 # in m  
        , neutron_polarisation=(1,0,0) # U // along beam, V & W in  
        ↪ detector plane  
        , qmap_disorder=0.35 # to avoid Fourier transform artefacts  
    )
```

```
[3]: # print detector properties  
probe.Detector.print_detector_info()
```

test detector has 64.0 x 64.0 pixels with a size of 15.00 mm x 15.00 mm.

```
[4]: # print beamline settings
probe.Beamline.print_beamline_settings()
```

Neutron wavelength = 6.0 Angstrom, detector distance = 15 m
Neutron polarisation set to [1. 0. 0.] in sample environment coordinate system
(u, v, w),

```
[5]: # plot detector map
probe.plot_qmap()
```

