



# Update from BIFROST, CSPEC

**Gregory S. Tucker**

DMSC

2023-10-26 DMSC STAP

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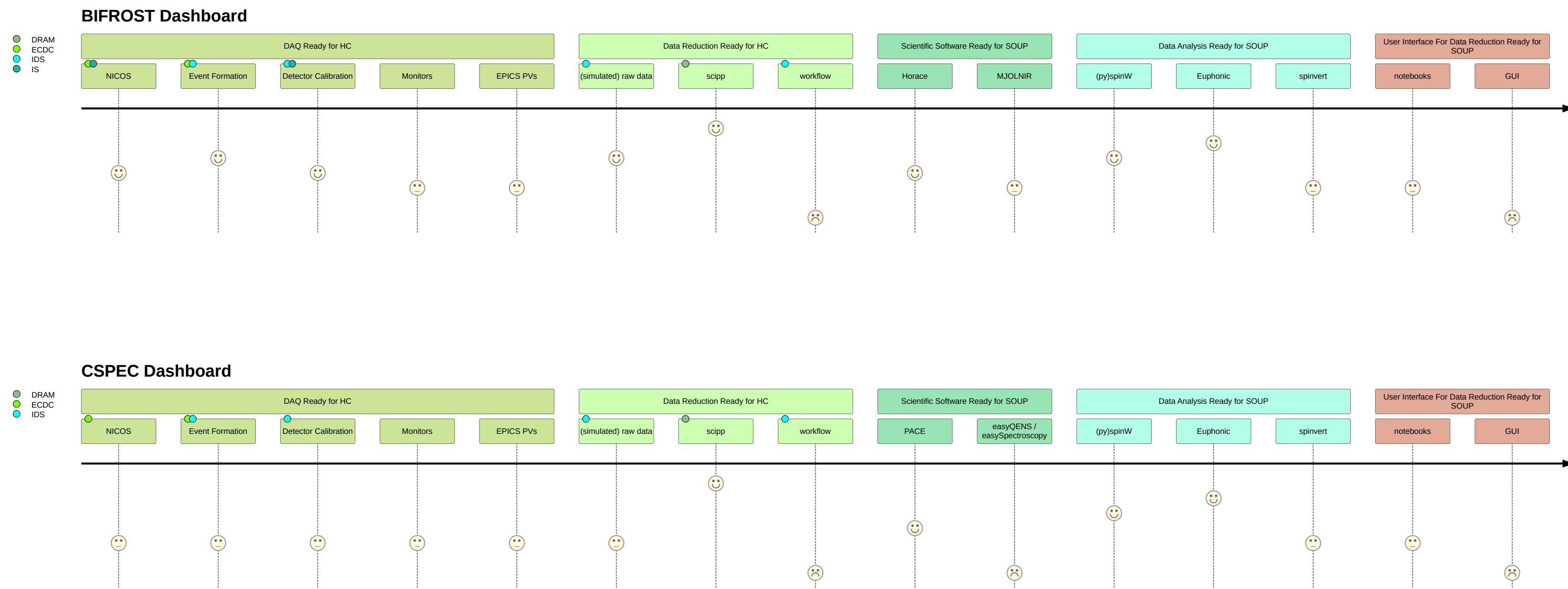
DMSC

2023-10-26 DMSC STAP

## Overview

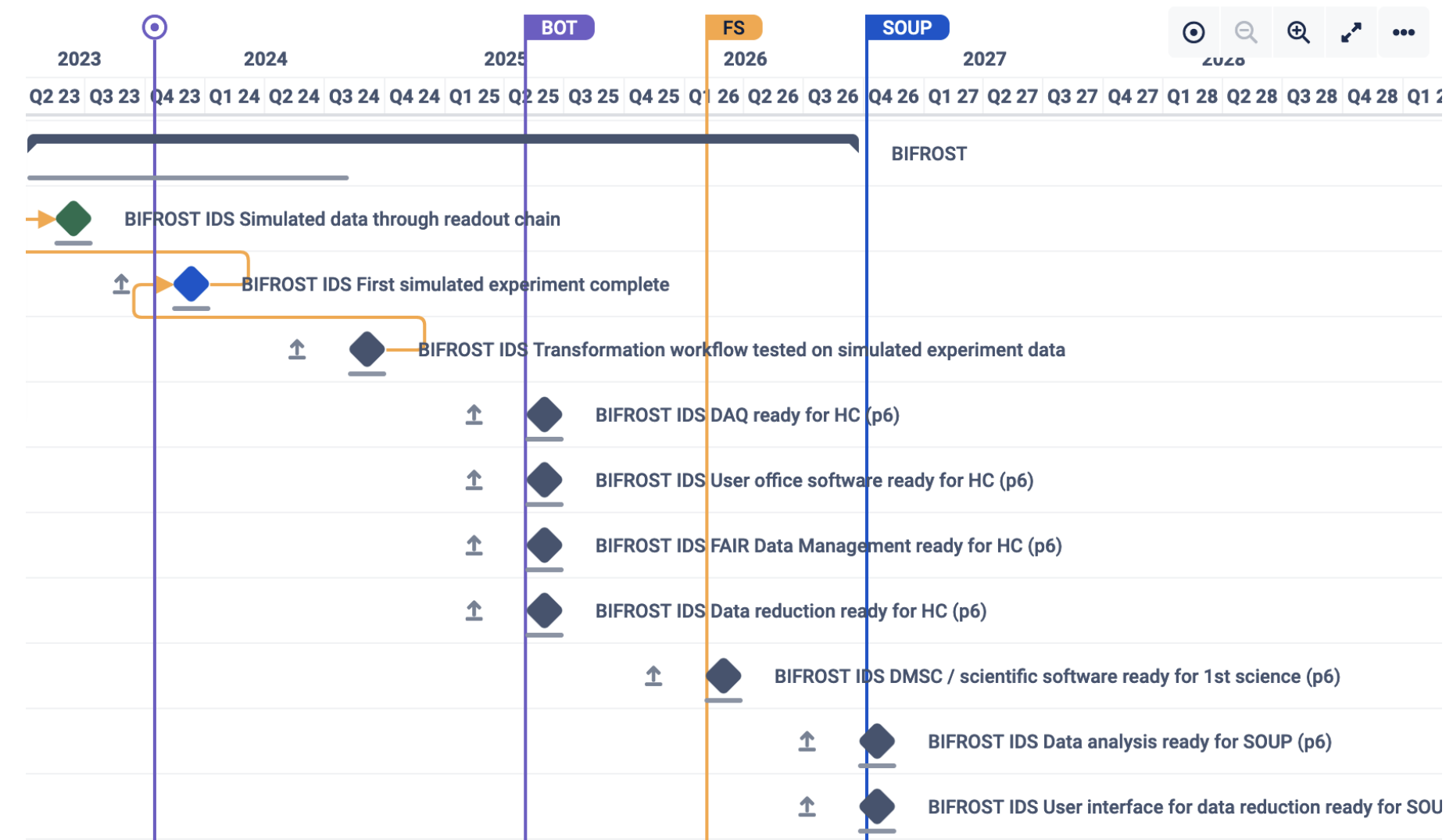
- Dashboards
- Milestones
- Interactions
- Major risks

# Dashboards



# Milestones

Clearly delineate the milestones for the next 6 to 18 months and provide us a status for those.



## Simulated data through readout chain

Q2 '23

- 
- **McStas** simulated neutrons and parameter data for BIFROST has been written to a NeXus file
    - the structure of the NeXus file may not match that of real instrument files
    - beam monitors produce neutron events, where histograms are anticipated for real data files
    - information needed for transformation to (Q, E) is missing, which is counter to FAIR practices
    - whole-instrument simulations only give reasonable count-rates for white-beam directed at vanadium
  - These data have not been analysed in **scipp**
  - Highlights need for pre-computed primary spectrometer MCPL files
  - Completed summer 2023

# First simulated experiment complete

Q4 '23

- Suitable simulated samples selected with BIFROST Instrument Scientist
  - Quantum Harmonic Oscillator for ( $|Q\rangle$ , E)
  - Single magnon for ( $Q$ , E)
- Automatic primary spectrometer MCPL generation, storage, and retrieval for new simulator scanning tool nearly ready
  - This should make simulations orders of magnitude faster at cost of extra correlation
- On track for completed simulated experiments by end of Q4.
- Plan to produce NeXus files via simulations with command-line interface, e.g.,

```
[user@visa]$ simulate BIFROST.instr max_ei=20 psi=1:180 a4=90:2.5:92.5 -n 1000000
```

```
Scanning (psi, a4) over 360 points:
```

```
pt    psi    a4    counts
```

```
-----
```

```
1     1.00  90.00  12345
```

```
2     2.00  90.00  67890
```

```
...
```

```
359  179.00  92.50  12345
```

```
360  180.00  92.50  67890
```

```
-----
```

```
Scan saved to BIFROST_20231025_104039.nxs
```

## Transformation workflow tested on simulated experiment data Q3 '24

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- Depends strongly on the availability of simulated experiment data
- General plan in place for data transformation
  - High confidence in `scipp` tools
- Positive outlook for feasible on-time completion.

# Interactions

*A discussion of interaction with the instrument teams is also helpful.*

## BIFROST

- Instrument Scientist visits DMSC regularly
- Interaction with ICEB members, e.g., through Danscatt

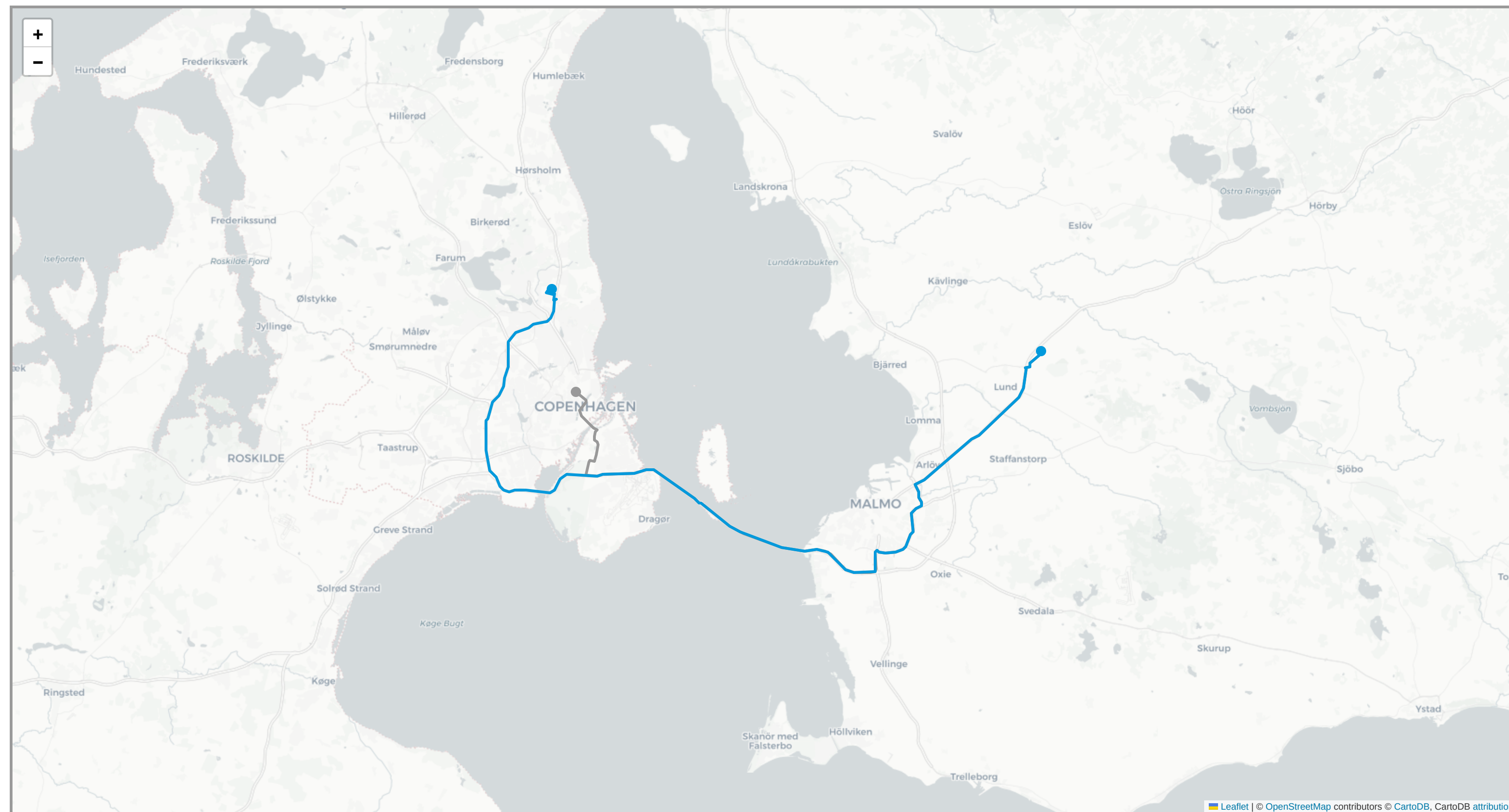
## CSPEC

- Instrument Scientist on maternity leave
  - Regular meetings before & anticipated to resume early next year



# Major risks

*Finally, a summary of major risks, "What keeps you awake at night?" should be provided.*

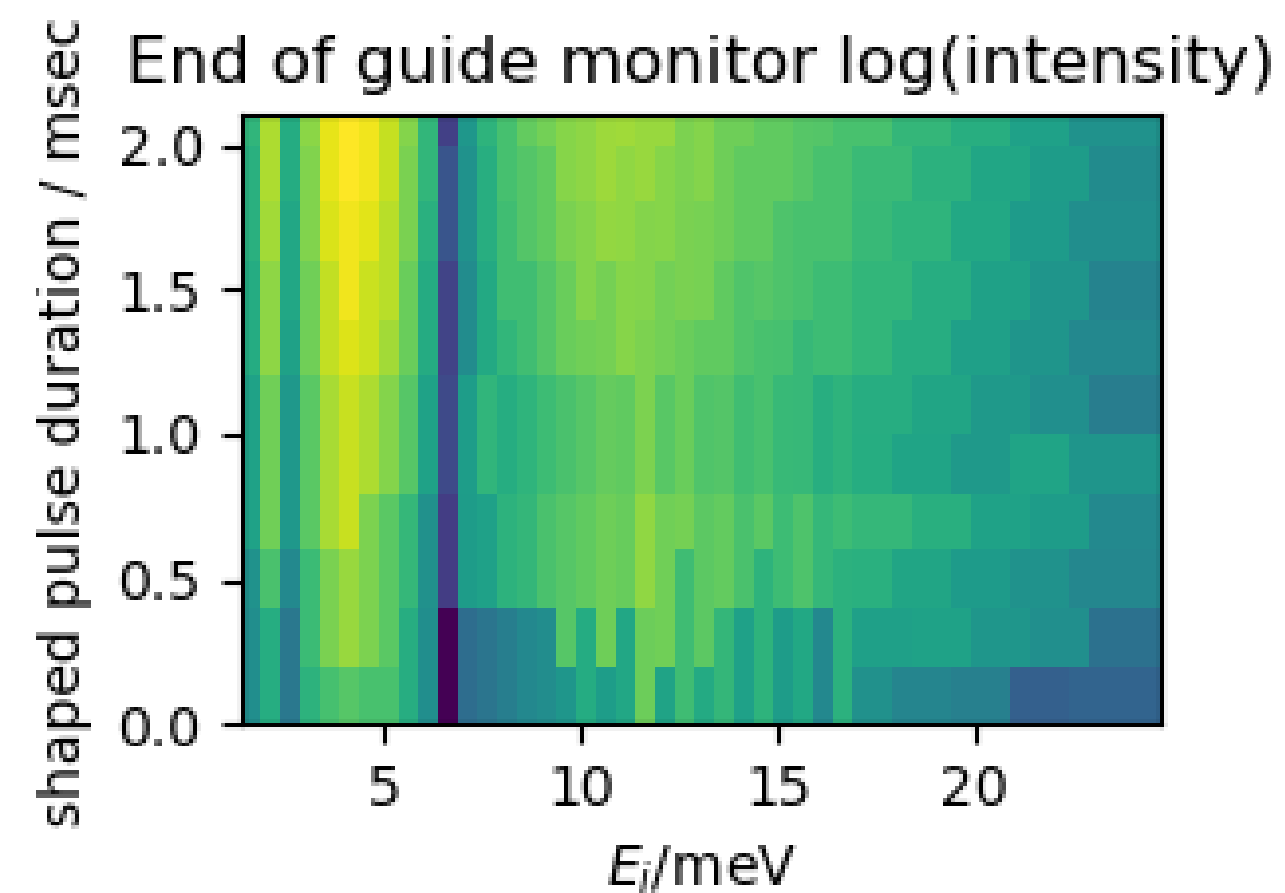


# Technical discussions

*Technical discussions, though interesting, should be limited.*

## Running the primary and secondary spectrometer simulations separately

```
run BIFROST.instr order=14 ei=1.7:0.5:24.7 t=0.0001:0.0002:0.002248 --split-at=split_at -m -n 10000
```

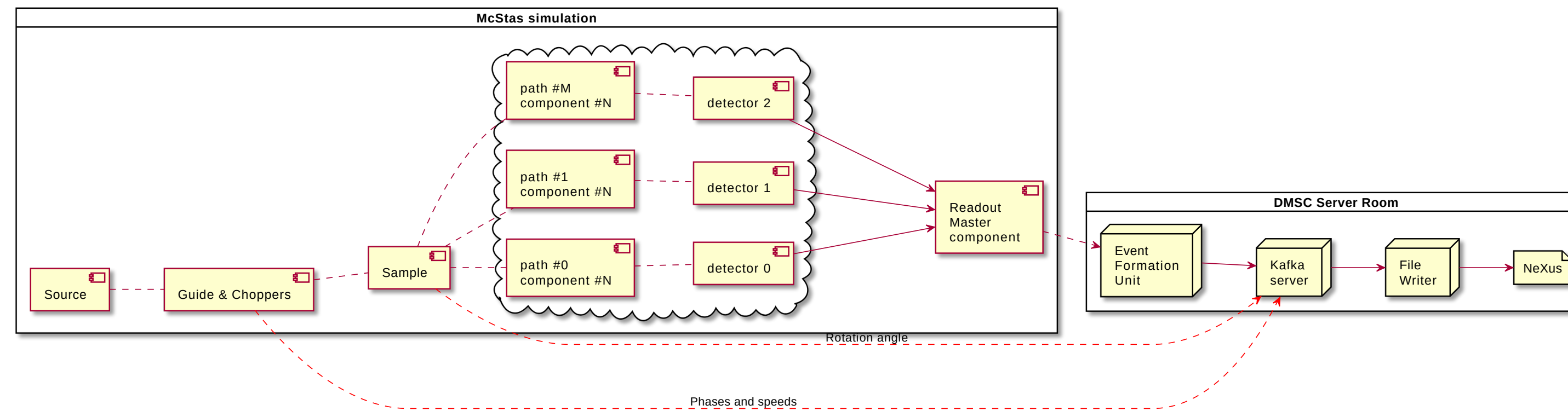


- Cached minimum-particle-count MCPL files
  - slow to generate fast to reuse
- This 517-point mesh scan of expected  $(E_j, t)$  parameter space takes 135 seconds the first time and ~50 seconds when repeated
  - strong intensity variation with  $E_j$  is likely a failure of the simulation, but needs further investigation

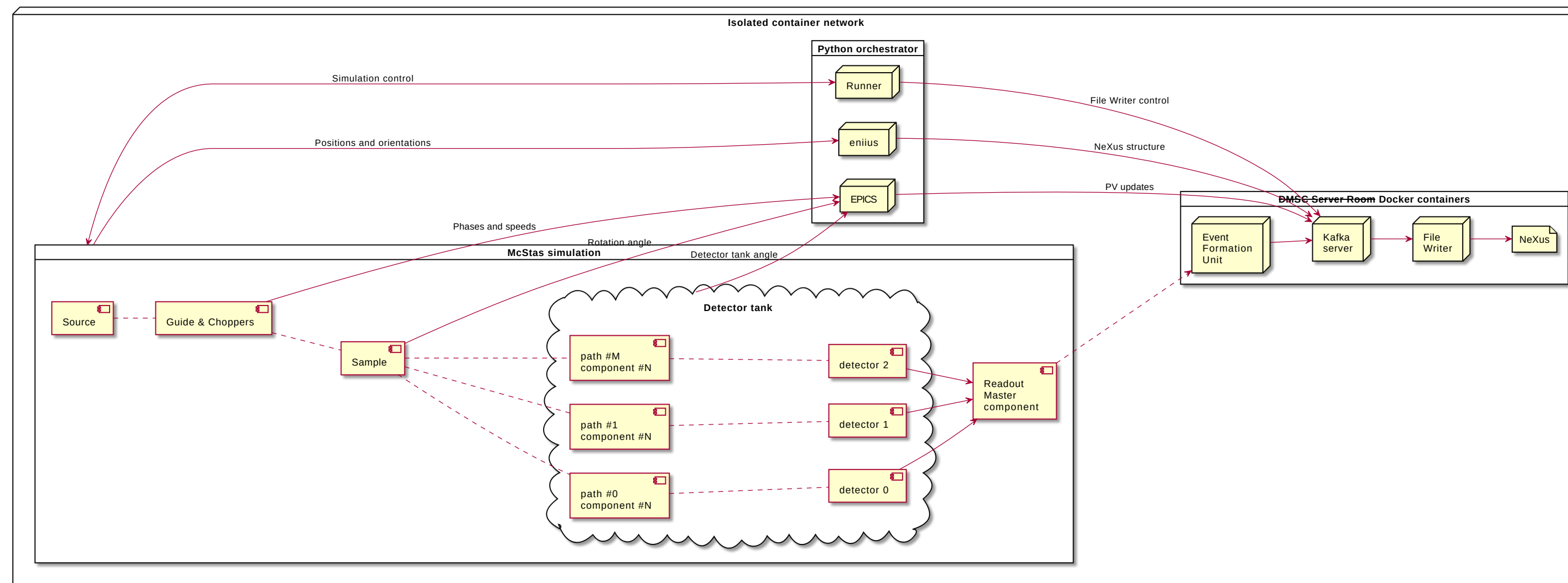
# BIFROST simulations

## Reminder

- BIFROST is the first CAMEA Time-of-Flight spectrometer
- Need realistic data to test workflows
  - data transformation
  - instrument calibration



# Implementation (simplified)



Questions?