

The Belle II Vertex Detector Upgrade

Christian Wessel

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christian.wessel@desy.de



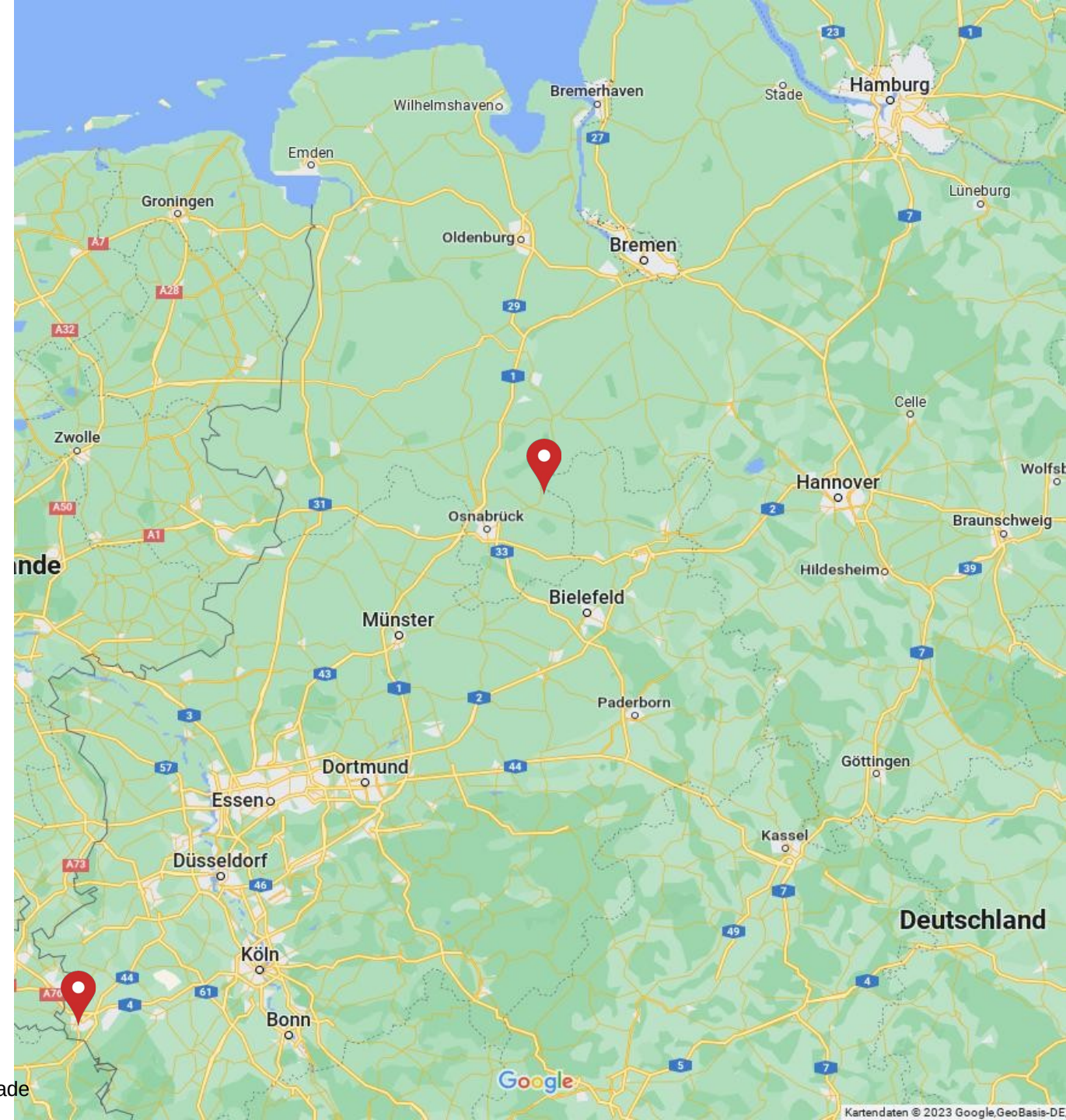
About Me

- Born and raised near Osnabrück



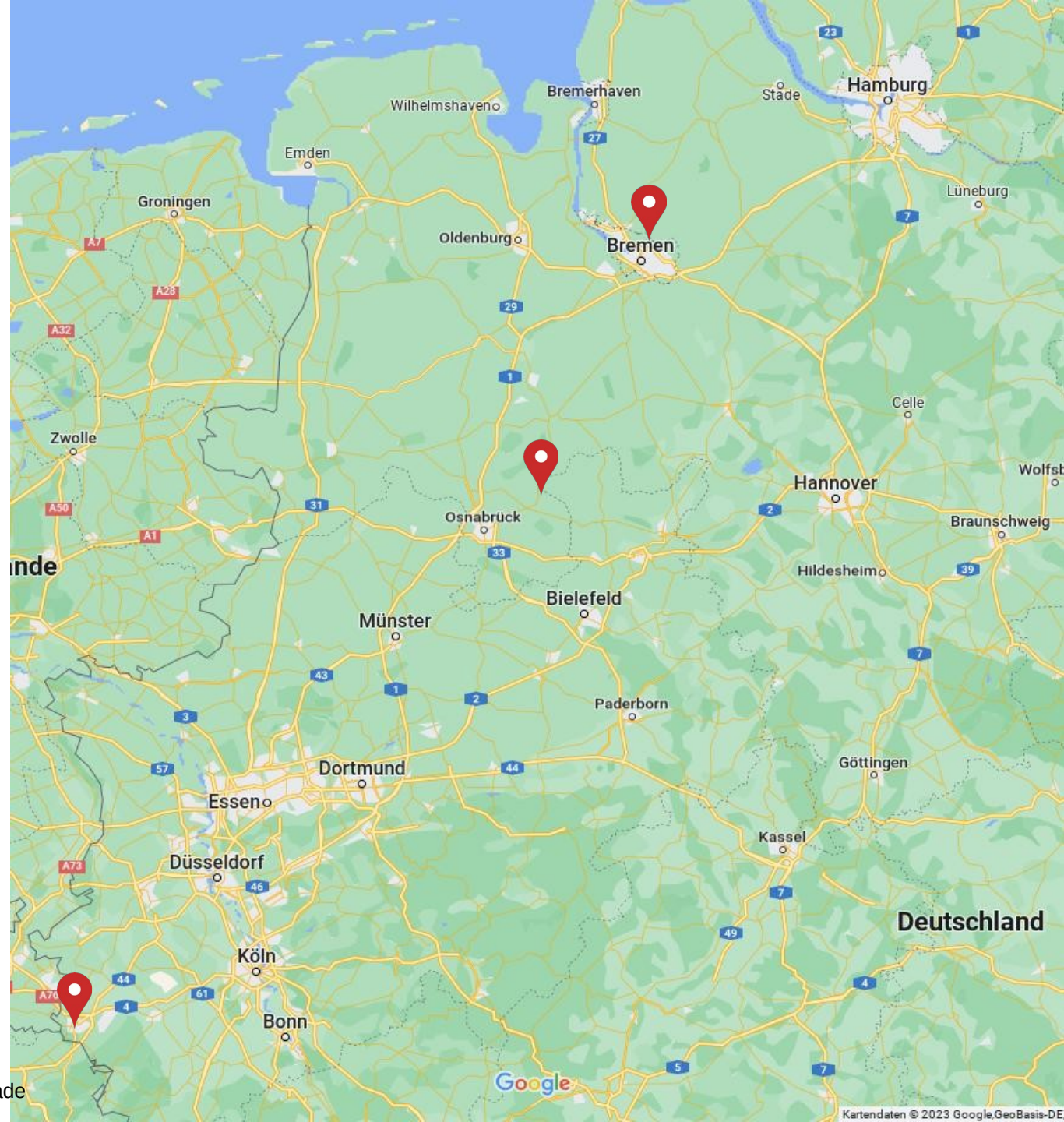
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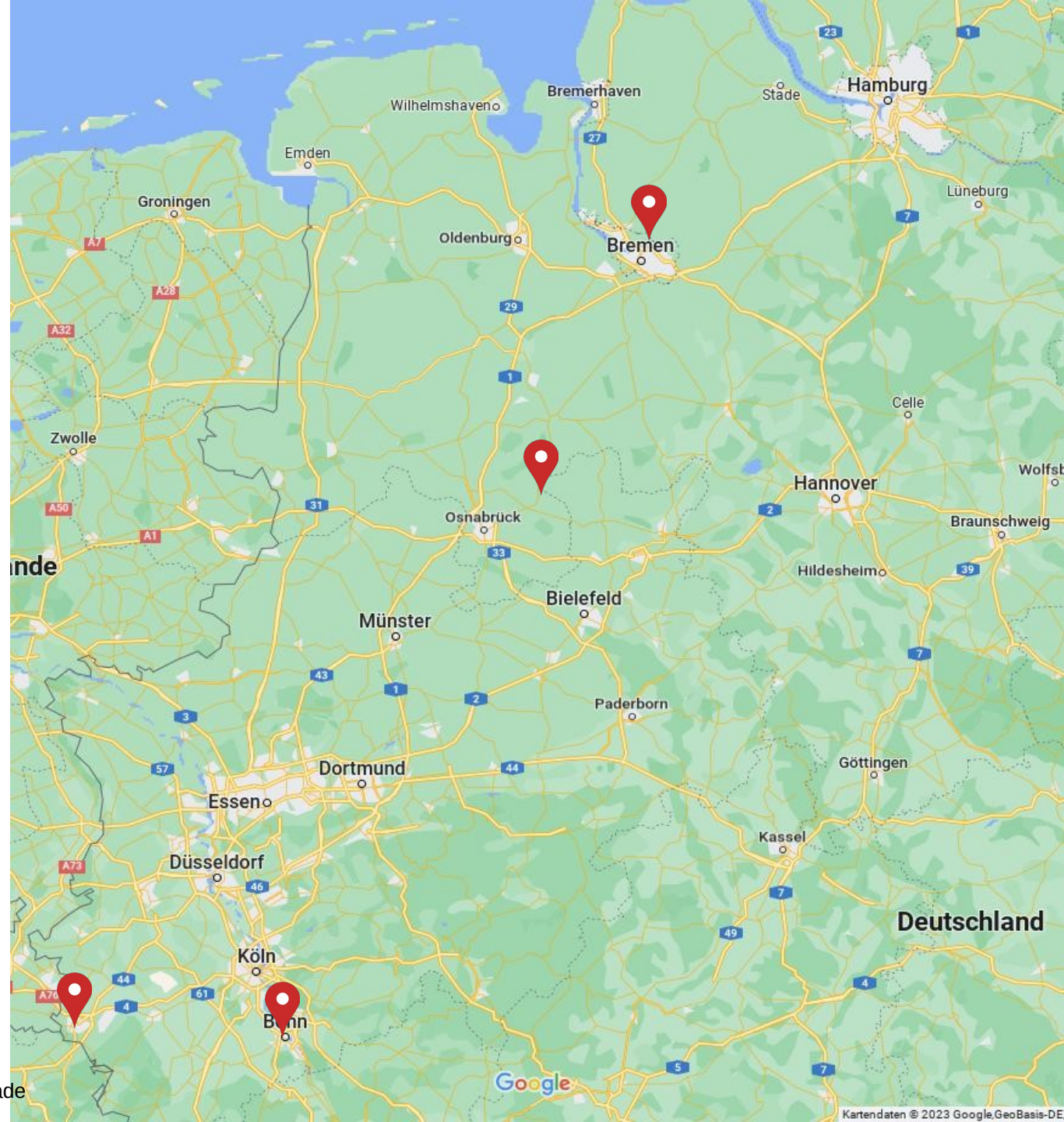
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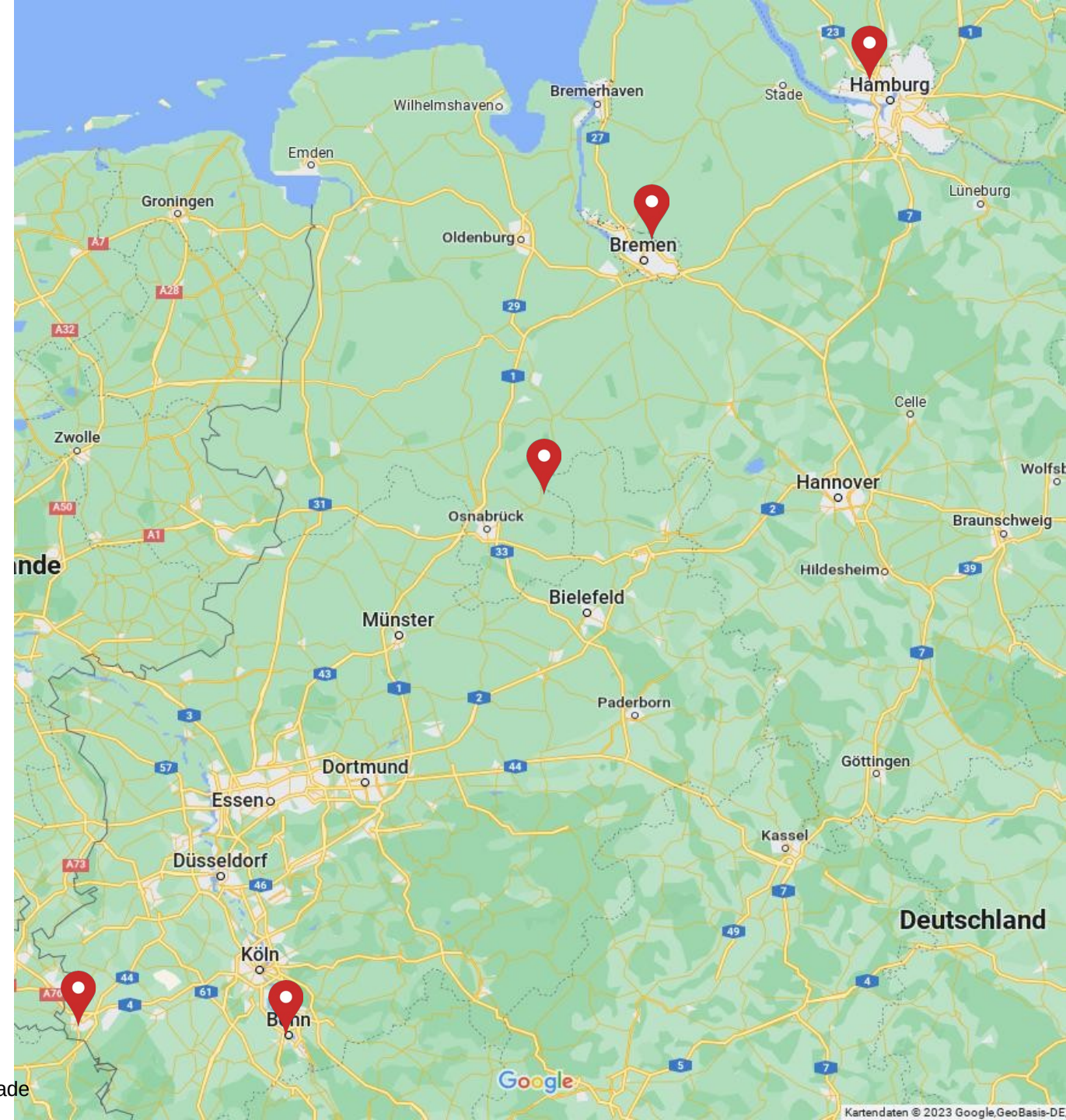
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- Bachelor (2011 – 2014), Master (2014 – 2016) and PhD (2016 – 2022) @ University of Bonn in the Belle II group
 - Online data reduction for the Belle II PXD
 - Tracking
 - Vertex Detector Upgrade
 - First studies of a TPC for Belle II
 - Few secondments to KEK, Japan



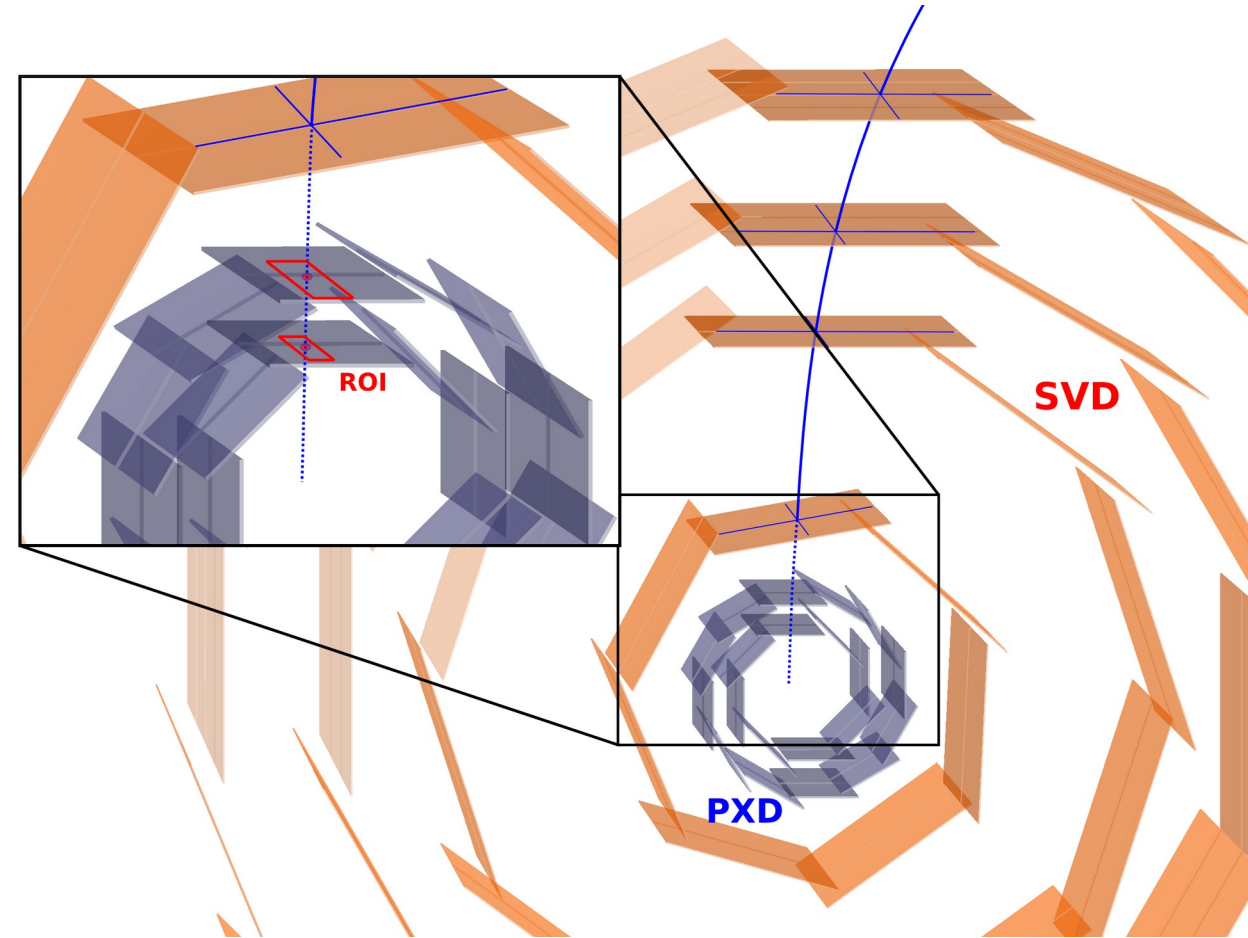
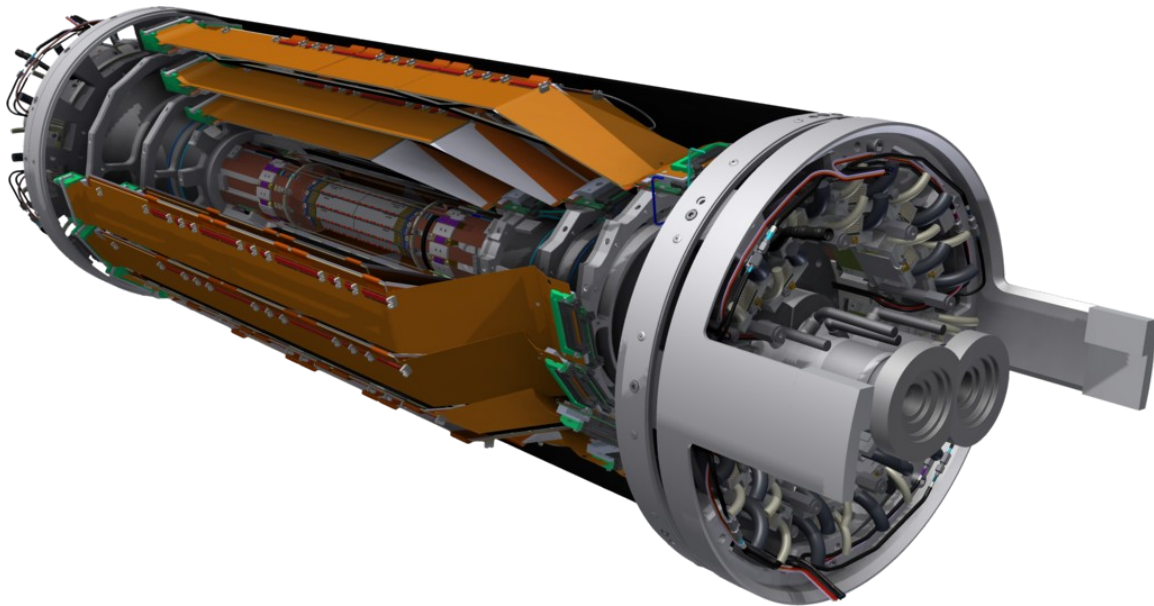
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- Since July 2022 @ DESY in the Belle II group
 - Tracking and $B \rightarrow X_s \gamma$ analysis



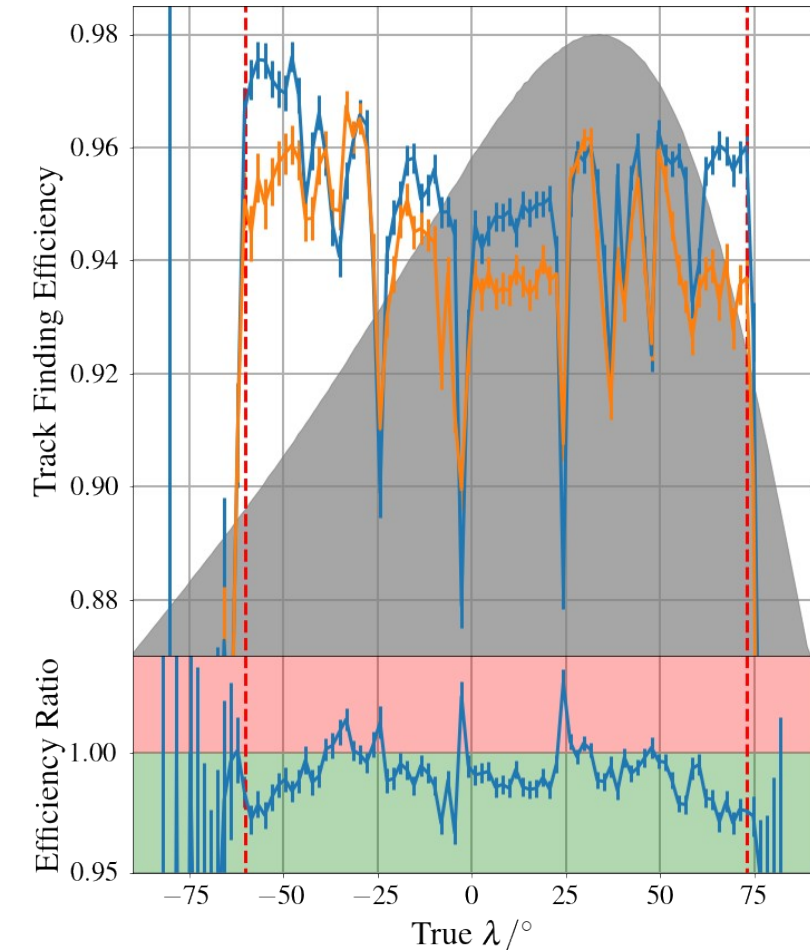
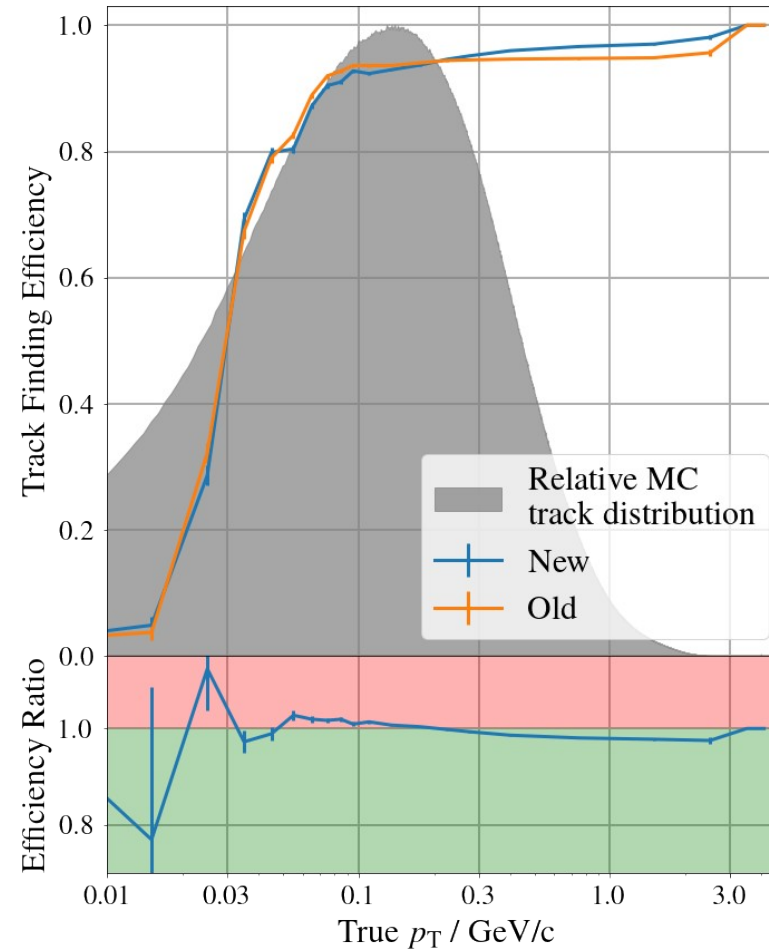
My PhD work

- Online data reduction for the Belle II PXD
 - Use hits in the strip detector (SVD)
 - Extrapolate them to the PXD
 - Create region of interest (ROI)
 - Only store hits in ROI



My PhD work

- Online data reduction for the Belle II PXD
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 - Create region of interest (ROI)
 - Only store hits in ROI
- New track finding algorithm for the SVD
 - Based on Hough transformation
 - +0.8 % track finding efficiency for $B\bar{B}$ events

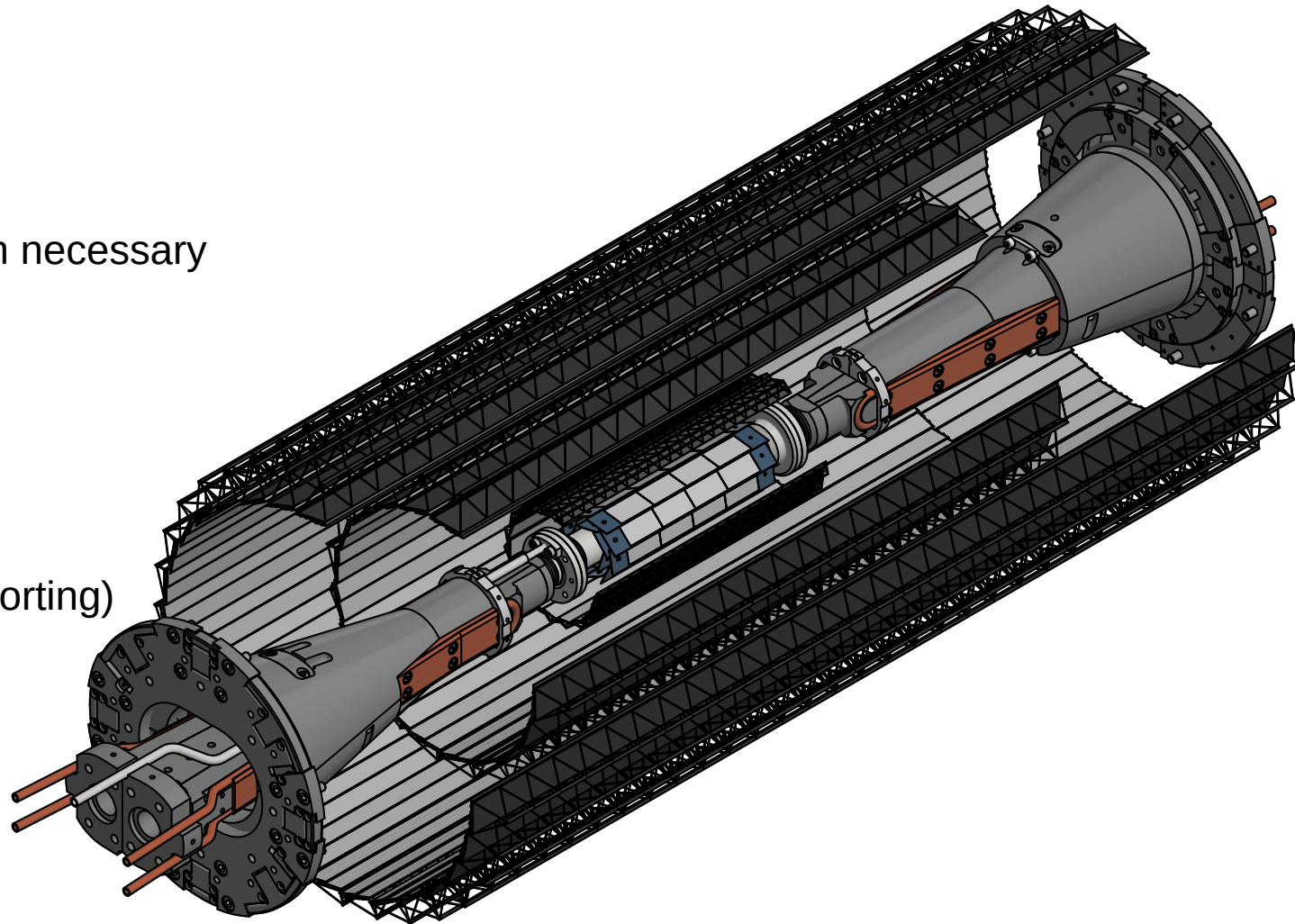


The vertex detector upgrade

- PXD and SVD are both well suited to run until end of Belle II
- PXD not used in tracking by default
 - Long integration time makes it difficult
 - Special DAQ necessary (e.g. ROI)
 - Limits low tracking in low pt range
- For target lumi likely changes to interaction region necessary
→ Why not build a new detector?

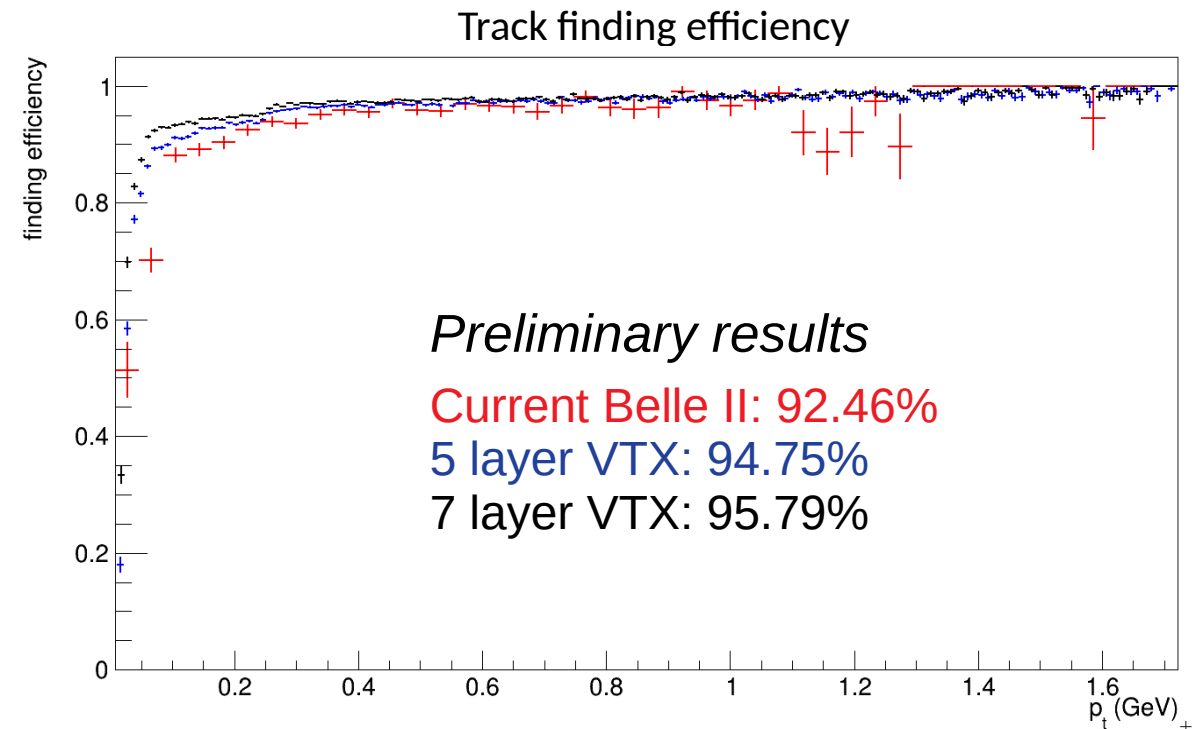
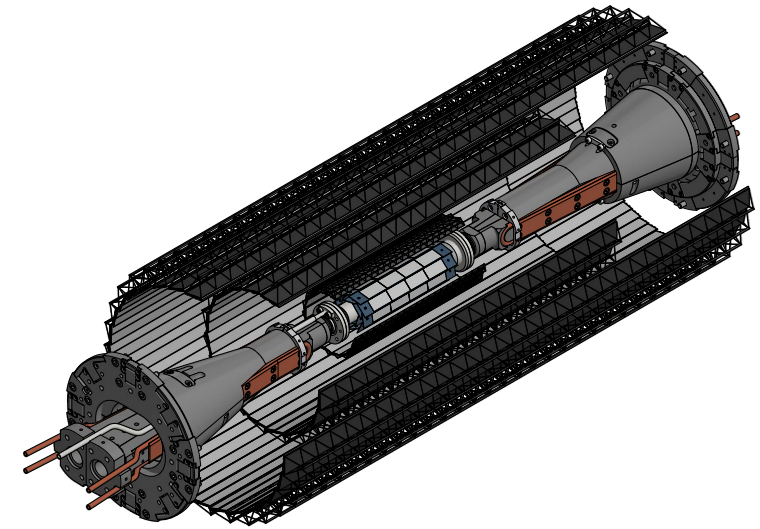
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 - The VTX detector
- 5 layer DMAPS CMOS detector
- Very low material budget
 - 0.1 % X_0 for two innermost layers (self supporting)
 - Around 1 % X_0 for outermost layer



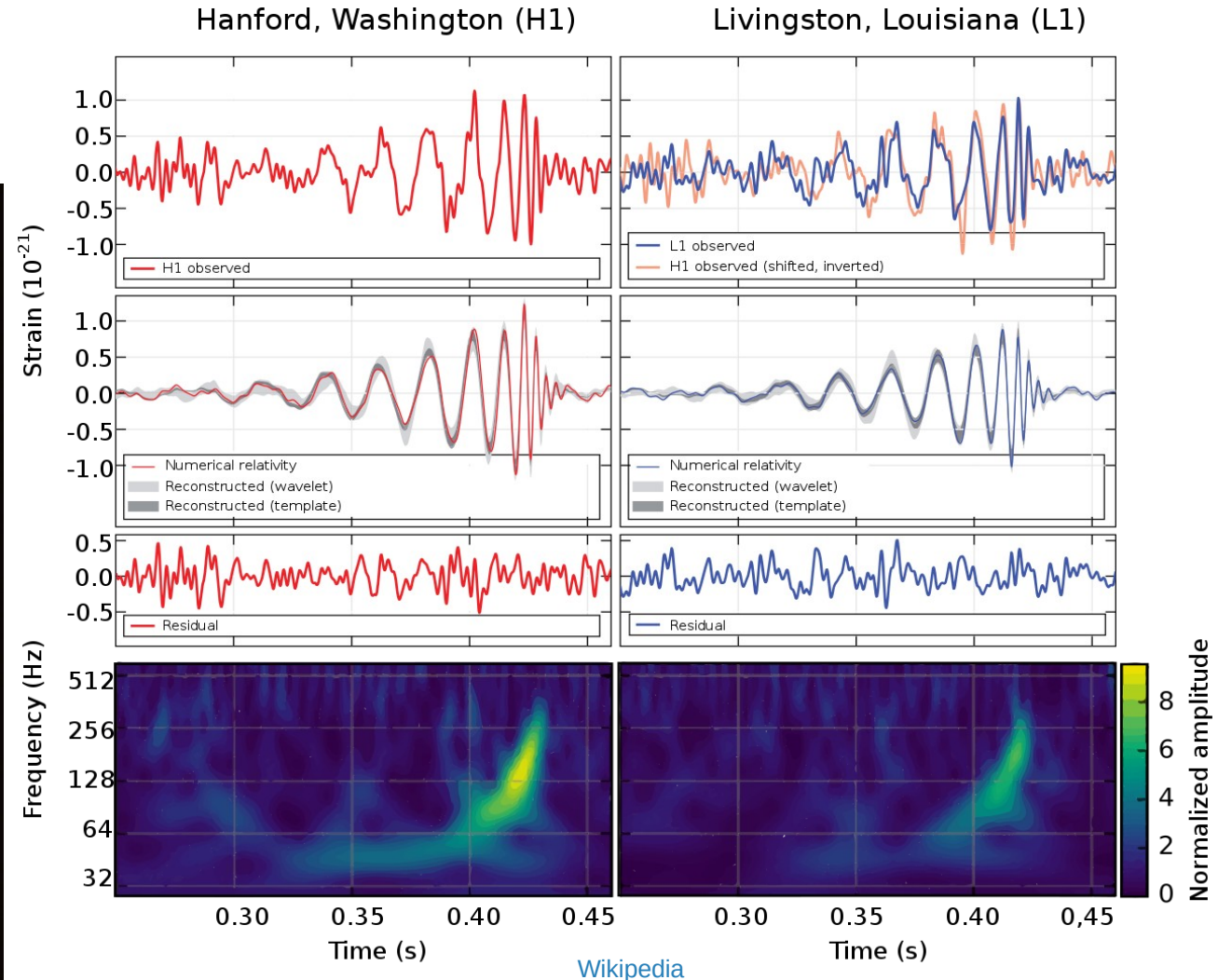
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- Shows the desired improvements in track finding efficiency in the low pt regime



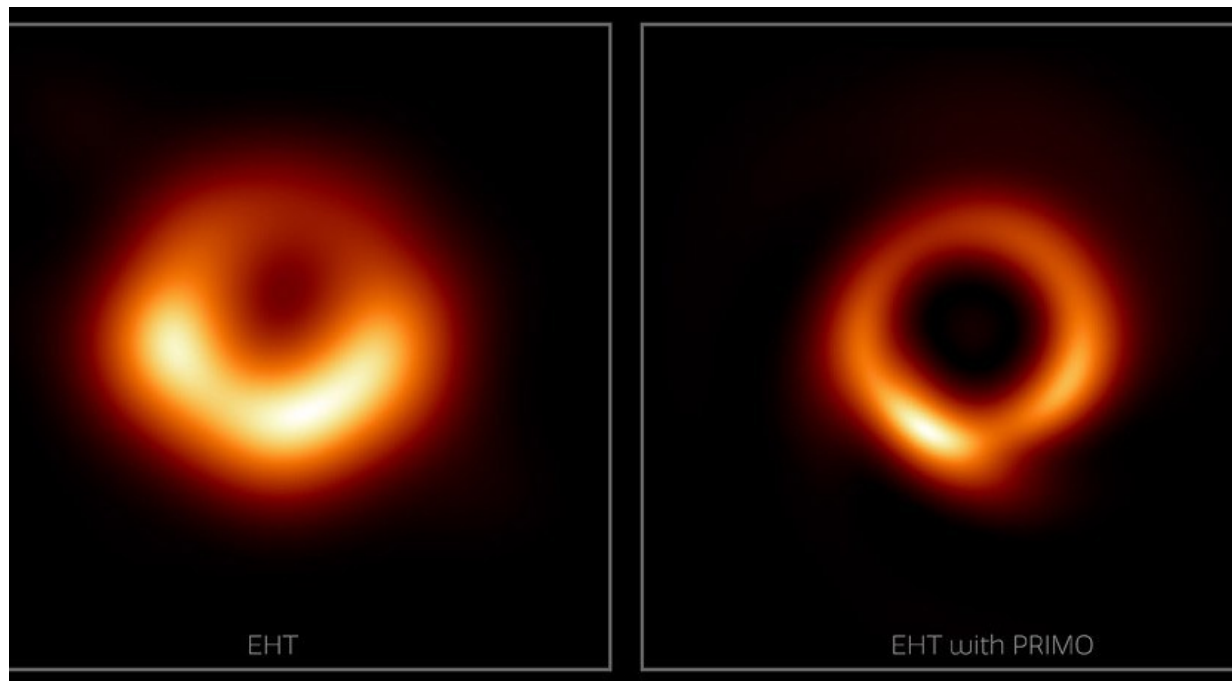
Favourite Plot(s)

- First observation of gravitational waves (14th of September 2015)
- First direct image of a black hole (Messier 87)

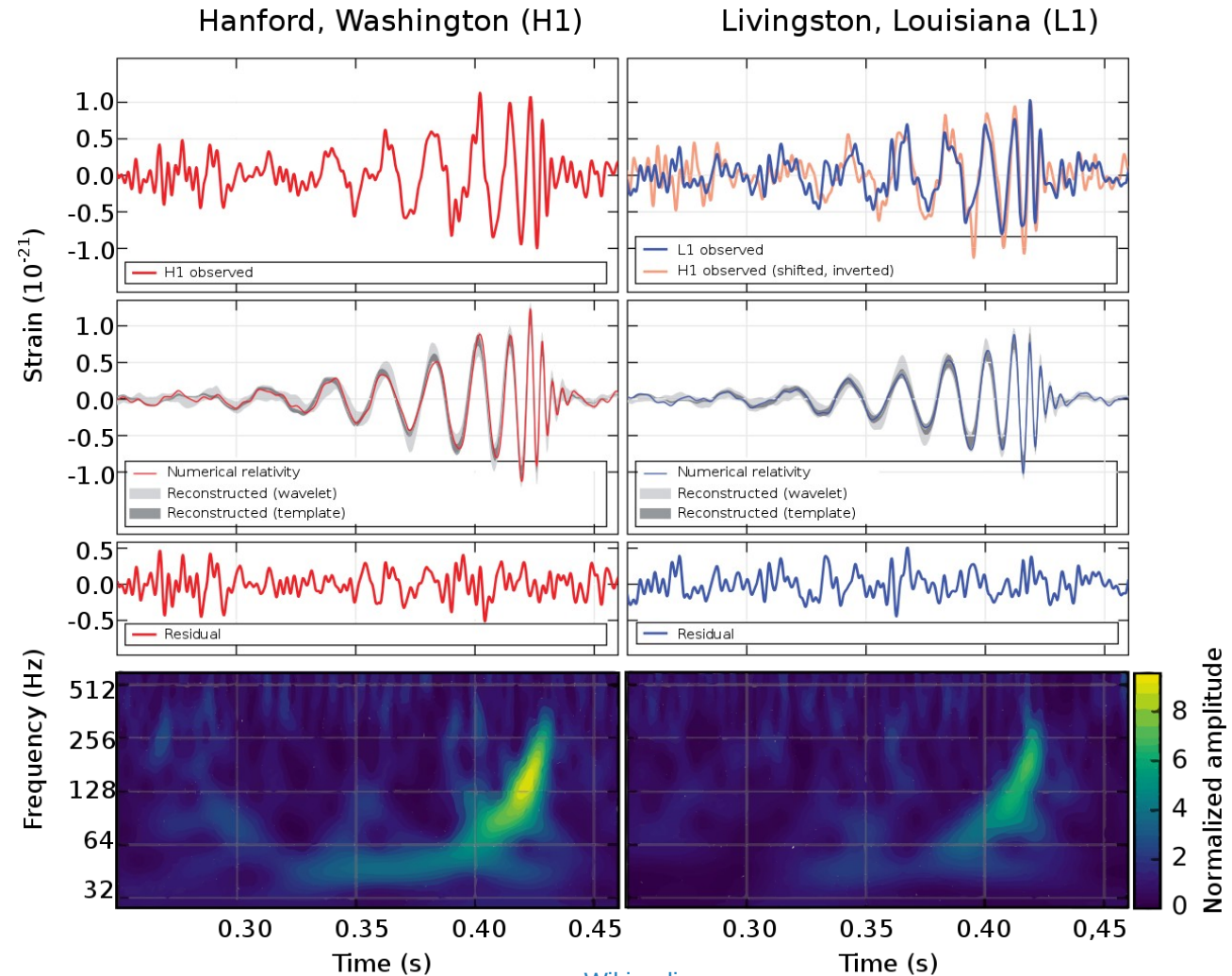


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- First observation of gravitational waves (14th of September 2015)
- First direct image of a black hole (Messier 87)
 - Got sharpened by AI



golem.de



[Wikipedia](#)

Features for release-08

exp1004

Thank you for your attention!

Contact

Deutsches Elektronen-
Synchrotron DESY

www.desy.de

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