

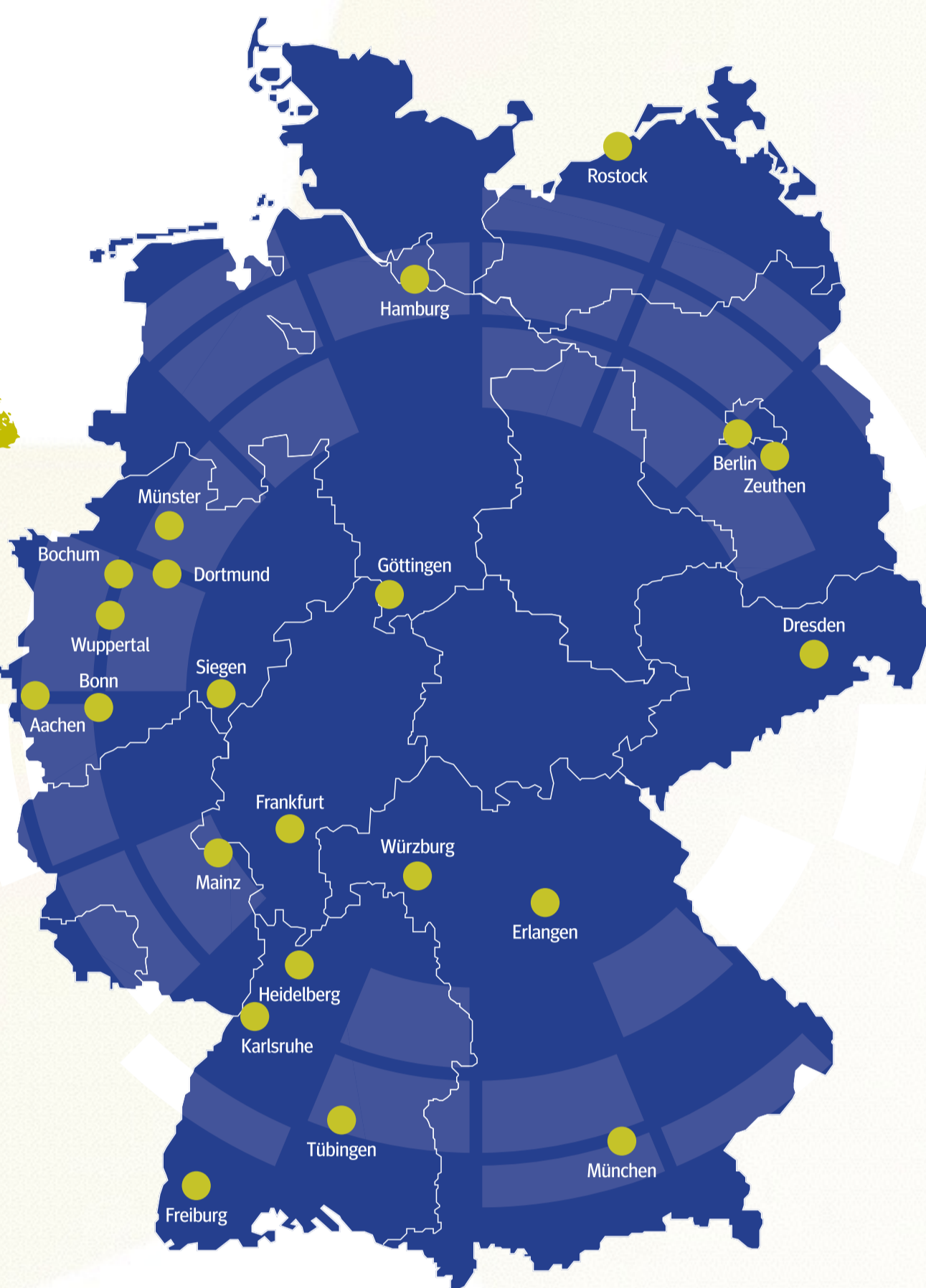
ASTROPARTICLE PHYSICS FOR HIGH SCHOOL STUDENTS

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Netzwerk Teilchenwelt

- network of communication specialists, science educators, scientists, and researchers
- consists of 24 German research institutes in particle and astroparticle physics
- goal: students authentically experience modern physics research and become a scientist

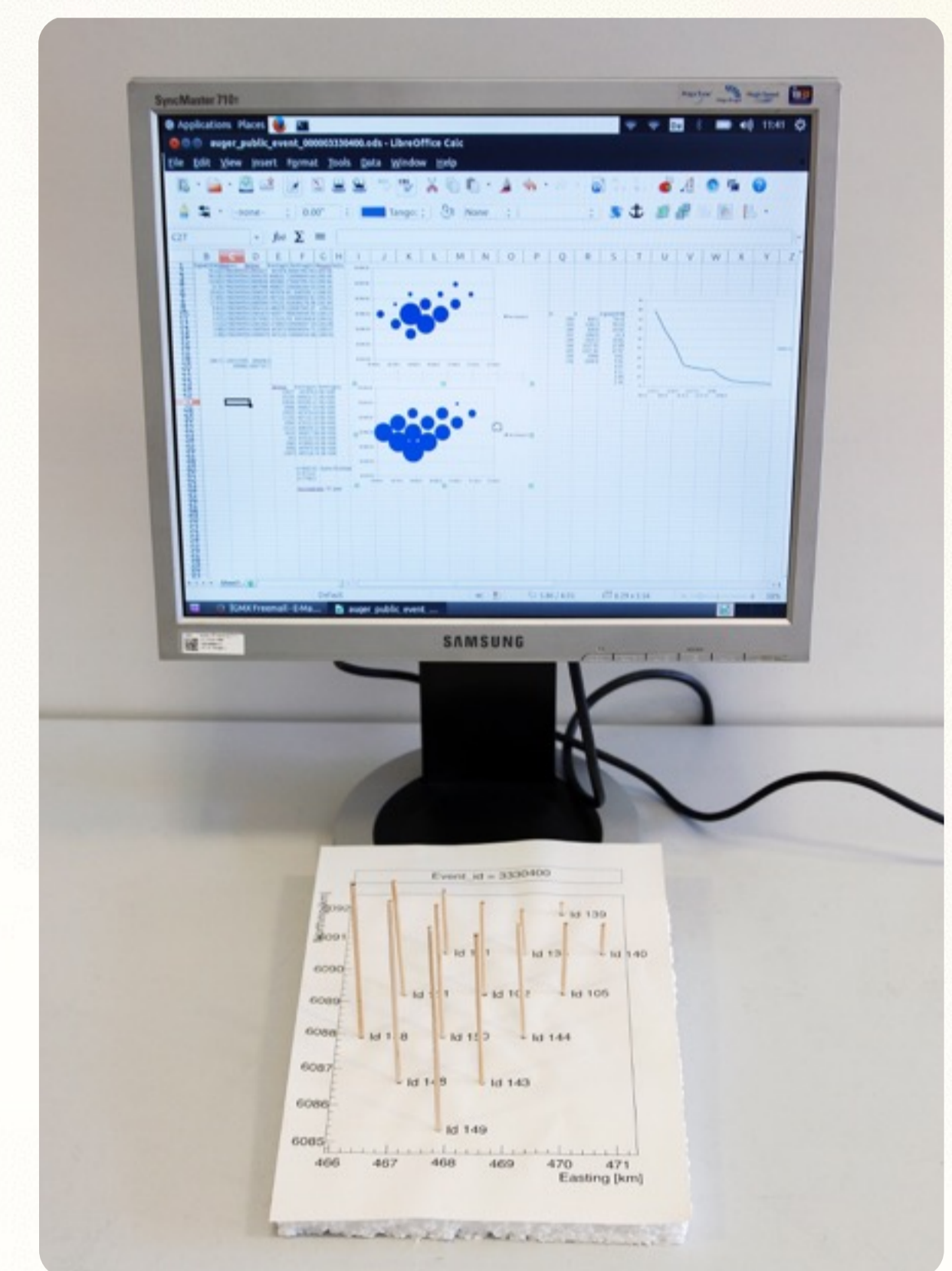


Pierre Auger Observatory

- located on Pampa Amarilla in Argentina
- consists of about 1600 water-Cherenkov particle detector stations covering an area of about 3000 km²
- addresses several unresolved questions about the spectrum, origin, composition, and interactions of cosmic particles with energies up to 10²⁰ eV [1]
- for the purpose of the Astroparticle Masterclass data from the surface detector are used

Astroparticle Masterclasses

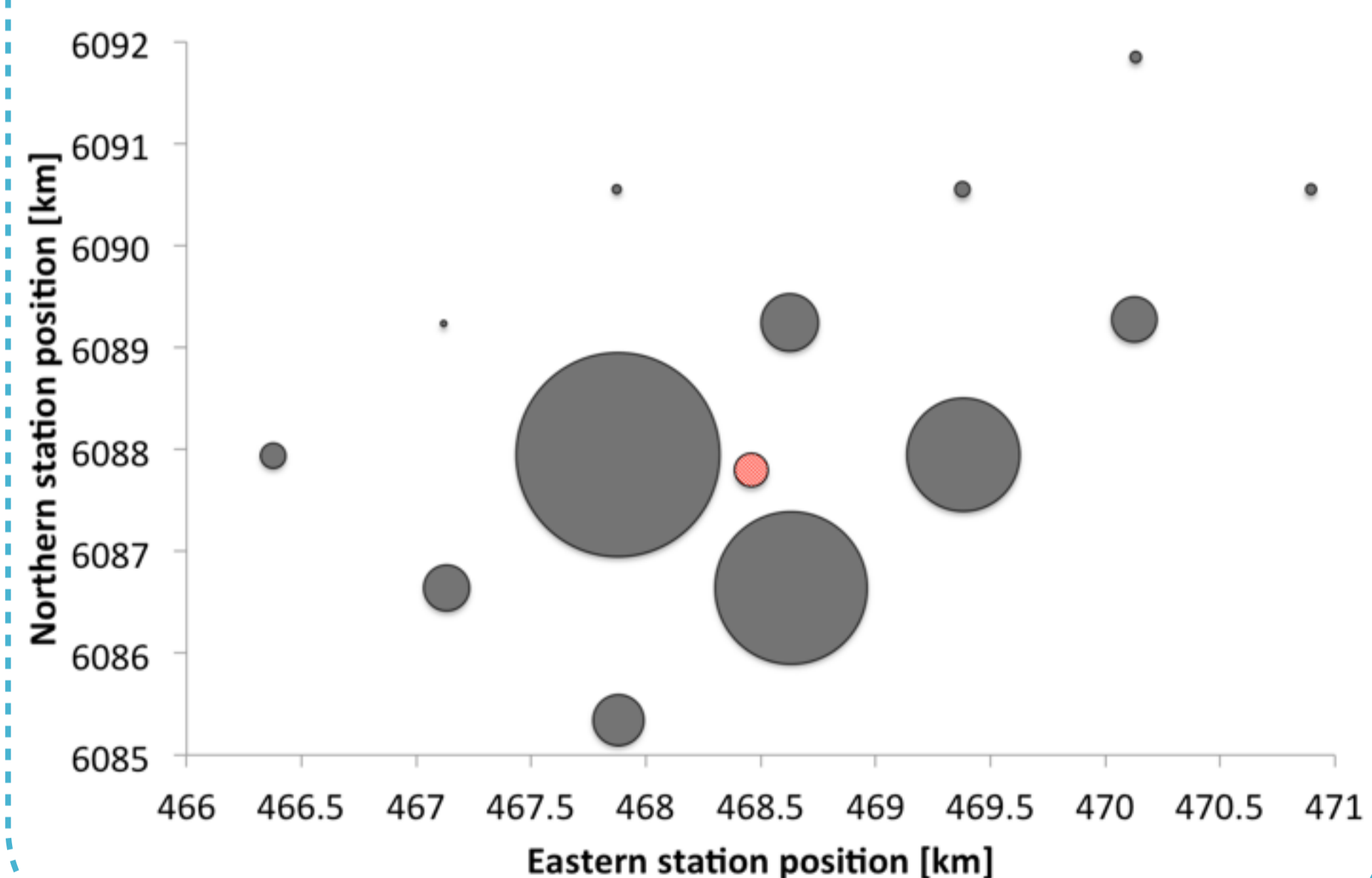
- high school students get the chance to explore the fascinating world of astroparticle physics
- deliver insight into how scientists investigate nature
- highlight: performance of measurements on real data [2,3] from an astroparticle physics experiment with current research methods [4,5]



High School Students Reconstruct Cosmic Radiation

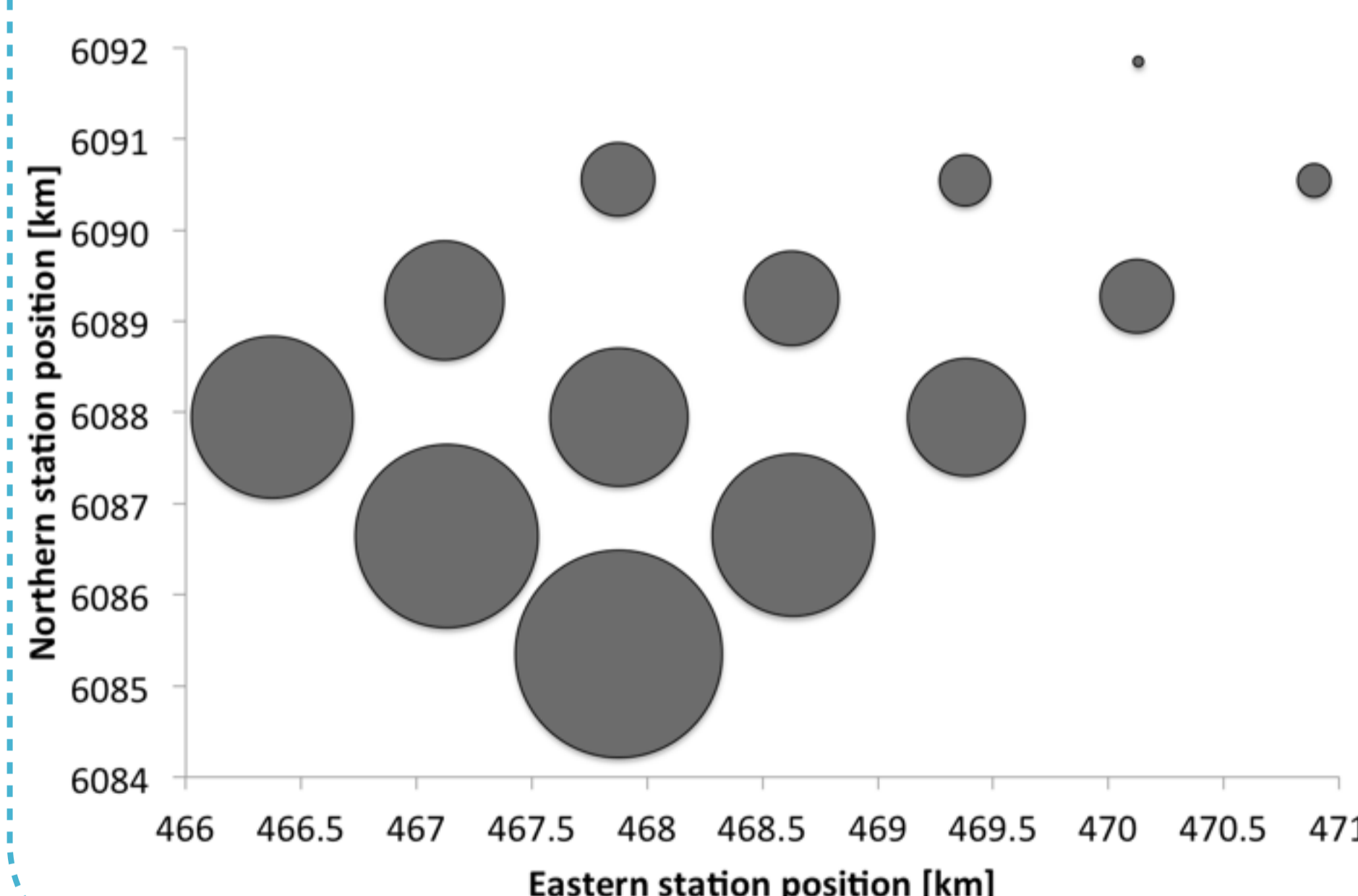
Shower Core

- reconstruction by calculating the center of mass of the detectors, with weight given by the signal
- impact point of the example marked as a red shaded circle
- radius of the circles proportional to detected signal strength in each station



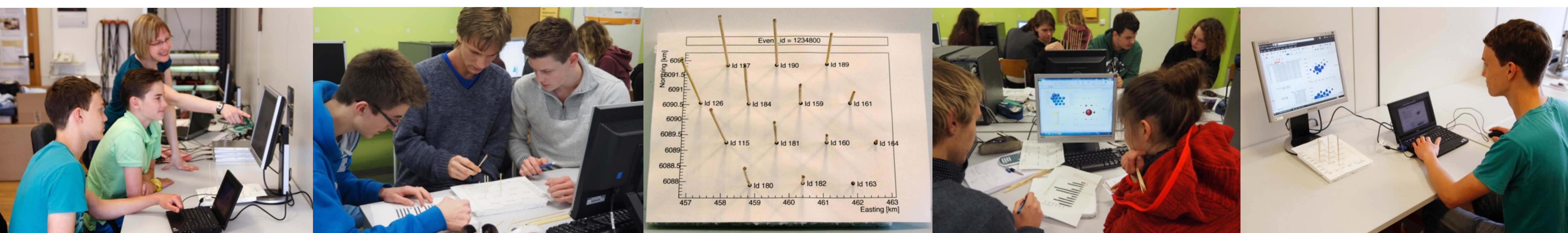
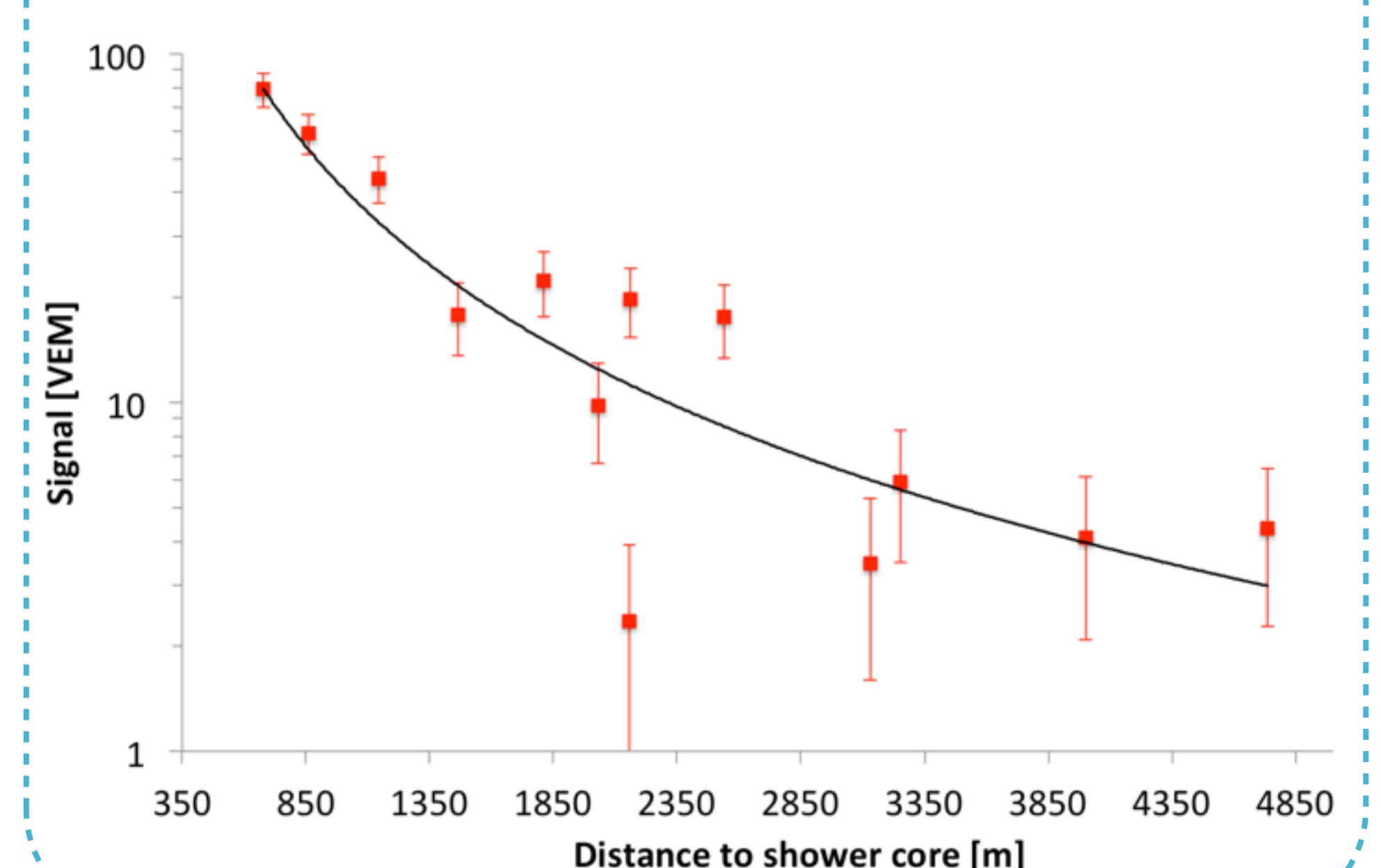
Arrival Time

- reconstruction of the arrival direction
- exercise is an important tool to study mathematics in 3D
- further: compute azimuth and zenith angle of arrival direction



Lateral Shower Profile

- computed from distance of each station which received a signal to the impact point of air shower on ground
- investigation of the density of particles in the air shower with respect to its distance from the shower core



References

- [1] Pierre Auger Collaboration, A. Aab et al., accepted for publication in Nucl. Instrum. Meth. A (2015).
- [2] University Wuppertal, <http://auger.uni-wuppertal.de/ED/>
- [3] Auger group at Colorado State University, <http://auger.colostate.edu/ED/index.php>
- [4] P. Abreu et al., in contribution to ICHEP 2014, accepted for publication in Physics B Proceedings Supplement.
- [5] V. de Souza et al., Physics Education 48 (03, 2013) 238.

More information can be found in the proceeding PoS(ICRC2015)304.