

The Bonn Particle Physics Show

Herbert Dreiner, **Steffen Schaepe**



DPG Frühjahrskonferenz, Würzburg, 19. März 2018



- Entertaining and educational show for kids aged 10 – 99
 - Fun and spectacular experiments
 - Usually ~ 2 hours, contains storyline as connecting element
 - **Students** (usually fifth term) develop and present show on their own
- ⇒ They identify with it
- ⇒ Can apply and convey their physics knowledge very early

Target group of show are the students!

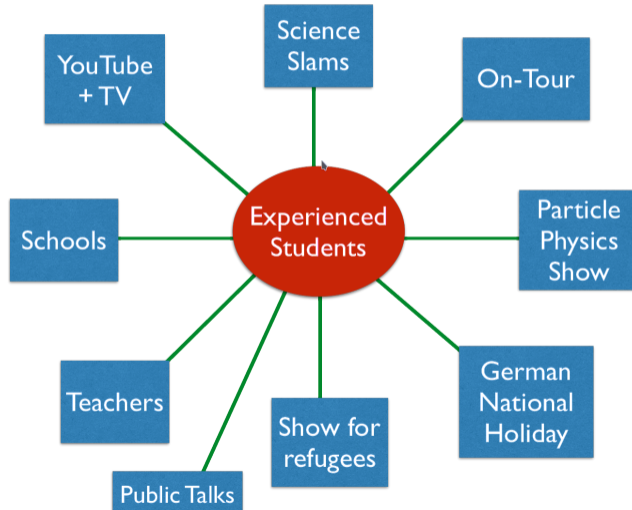


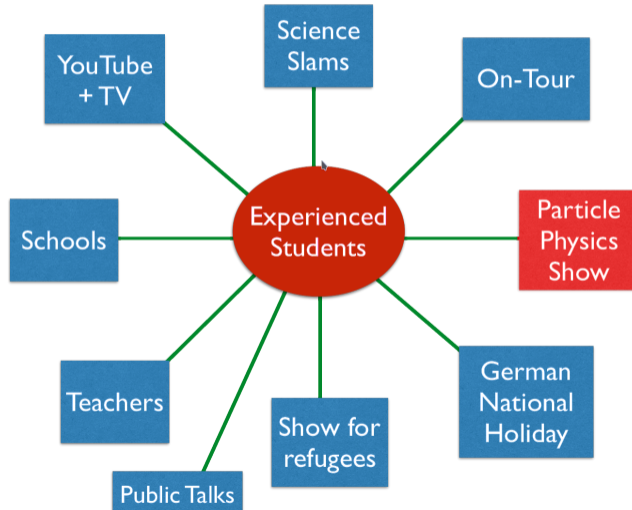
Some guiding principles

- Nothing happening on stage must remain unexplained
- All explanations must remain short and simple (Target age 10+)
- No experiment must remain unconnected to the story line
- Everybody must have fun at all times (students are doing this in their free time)
- ... including Herbi



- Started by Herbi Dreiner with the help of Michael Kortmann
- First show in 2002
- Since then 13 crews
- ⇒ > 250 students trained in outreach
 - Usually 2×3 shows per year
- ⇒ > 50000 audience reached
 - Awarded with two prizes: 2006 Bonn University Alumni Prize, 2009 EPS High Energy Physics Outreach Prize (no DPG prize yet . . .)







- Most ambitious project yet: Show on modern physics for total non-experts
- Originated from show in 2004 on the occasion of CERN's 50th anniversary set up by M. Kobel & E. Paul w/o ties to physics show
- In 2008, revamped for "Weltmaschine" exhibition in Berlin as physics show spin-off
- No storyline, more "serious" than normal physics show
- Explain experimental methods, all particles and concepts of the Standard Model and ties to cosmology
- Particle shelf as connecting element
- Strong focus on simple yet correct explanations

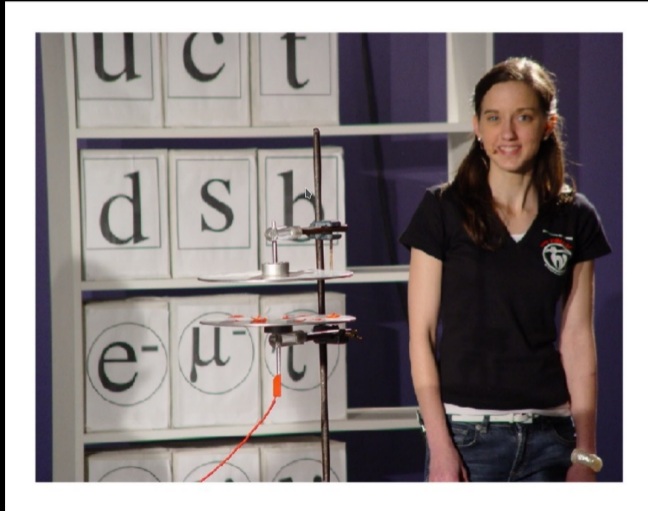


U-Bahn station: Bundestag, 2008



Particle Physics Show

Impressions



Jacob's Ladder: Detector







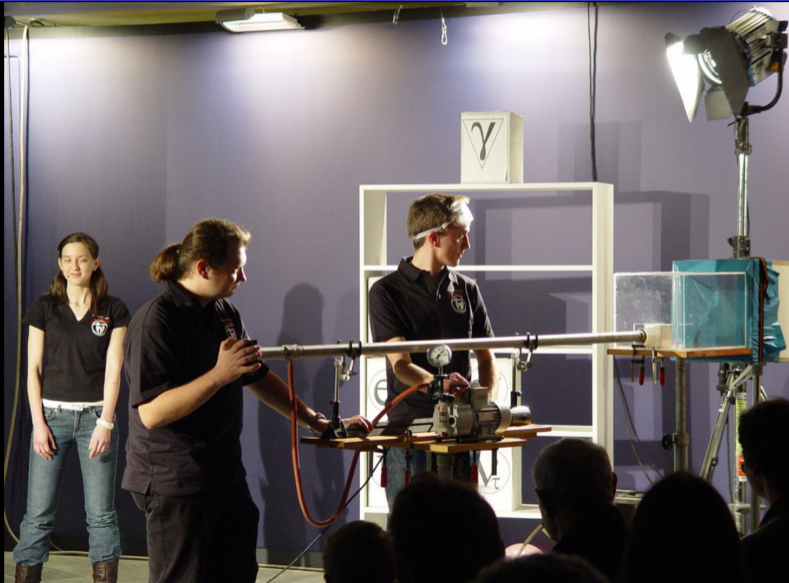
Performances

- 2008 Weltmaschine exhibition, Berlin
- 2009 Deutsches Museum, München
- 2009 University of Heidelberg
- 2009 DESY, Hamburg
- 2010 CERN Globe, Geneva (in French)

- In 2012 received large grant in framework of CRC110: 65k€ over 4 years
- Developed new show in the spirit of the Physics Show, including story line and entertaining parts
- Story: Time travel through history of particle physics
- Target group: age 14+
- Five scenes:
 - Today Prolog
 - 1909 Manchester: Rutherford, Geiger
Structure of the nucleus, detection of particles
 - 1950s Berkley: Lawrence, assistant
Accelerators
 - 1980s DESY: S. L. Wu, H. Zobernig
Strong interaction
 - Today CERN: 2 scientists in the LHC tunnel
Colliders and Higgs













Performances

- 2014 Oxford and London (in English)
- 2014 Deutsches Museum, Bonn
- 2015 Padua and Trieste (in English)
- 2016 Copenhagen and Odense (in English)
- 2017 Valencia and Barcelona (in English)
- 2018 University of Bonn
- 2018 Stadttheater Mainz (today!)
- 2018 Lisbon and Madrid (planned)

- Need 15-20 people
 - All experiments performed and explained live on stage \Rightarrow 11 speaker roles
 - Music and Lighting
 - Closeup of experiments broadcast to screen \Rightarrow Camera operators
 - Someone who takes care of logistics and coordination (important!)
 - Someone who takes care of radioactive probes (has to be trained)
 - At least one experienced technician in case things go wrong (they do!)
- Has to be rehearsed thoroughly
- For abroad shows, all equipment has to be shipped (legal formalities)
- Last minute adaption to local venue

- Designing a show on particle physics for the general public is challenging
- ...but extremely rewarding once it works
- Lot of time and dedication needed
- ...from both staff and students
- Traveling with a show requires a lot of logistics
- ...but is of course the icing on the cake
- 110 page paper including the full play and technical details on all experiments on ArXiv <https://arxiv.org/abs/1607.07478>
- **Contact: dreiner_at_uni-bonn.de**

It's a lot of fun for everyone if it's done right

Go try it yourselves!