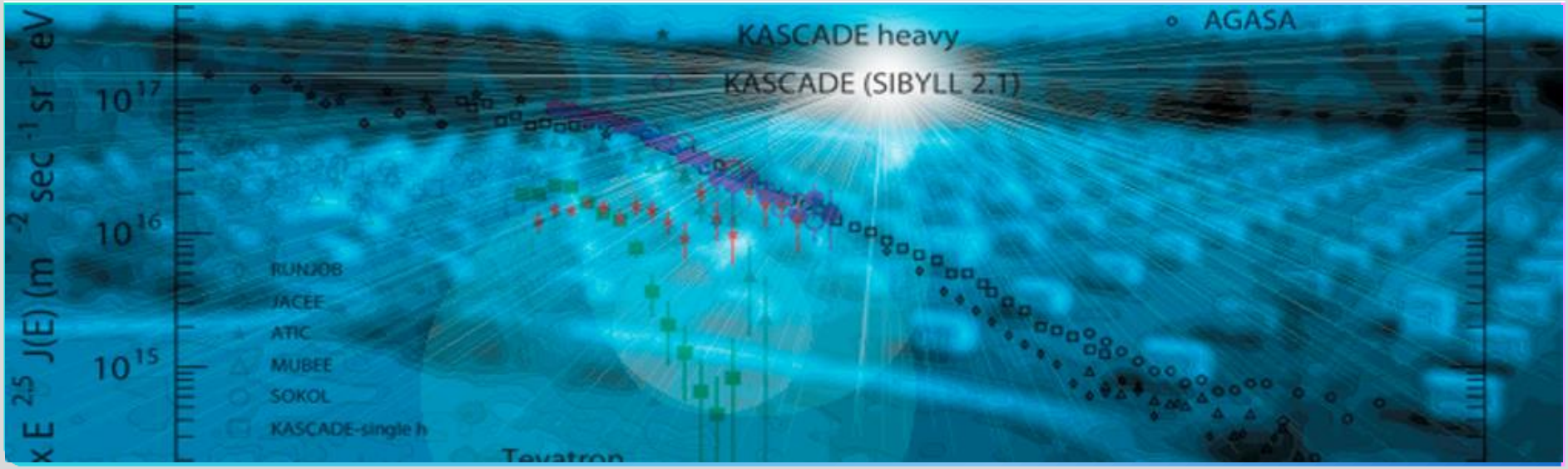
Karlsruher Institut für Technologie

KASCADE KCDC Cosmic Ray Data Centre

KCDC: releases and future perspectives

Institut für Kernphysik (IKP)

Jürgen Wochele, Doris Wochele



What is KCDC ?

Acronym for "Kascade Cosmic ray Data Centre"

Aim: installation and establishment of the first public data centre for high-energy astroparticle physics based on the data of the KASCADE-Grande experiment;

How: provision of the KASCADE-Grande data through a web-based interface;

What: we published measured and reconstructed data, calibration data, event information,

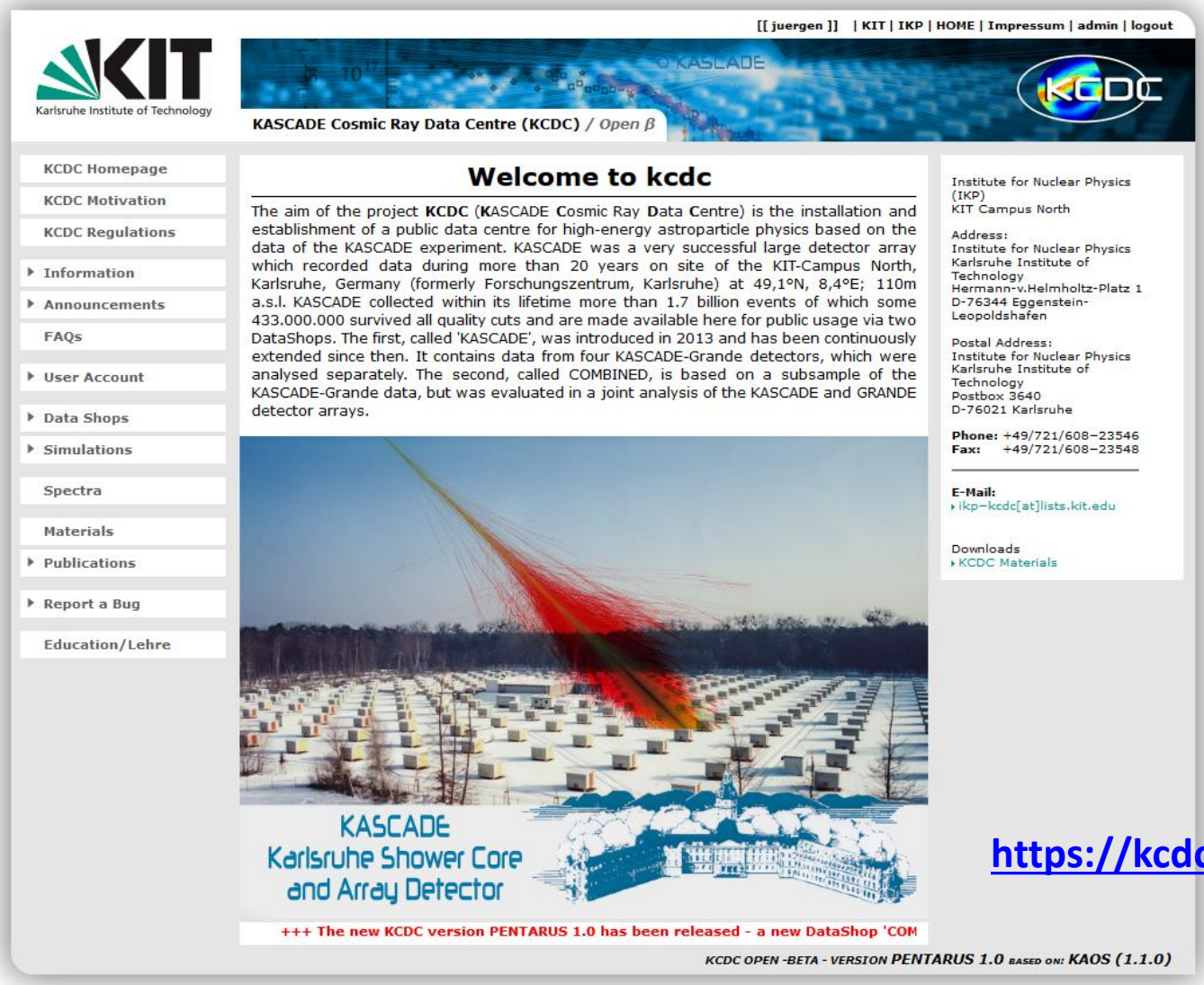
from 4 KASCADE-Grande detector components:

- the KASCADE detector array (252 stations),
- the GRANDE detector array (37 stations),
- the Central Hadron Calorimeter (> 40.000 data channels),
- the Radio LOPES (30 antennas),

More: additionally we publish:

- matching simulations for all detector components but LOPES,
- Preselected data sets for direct download,
- detailed documentations,
- up to now 98 spectra data sets from 26 high-energy cosmic ray experiments published between 1984 and 2020 for download.

KCDC web portal

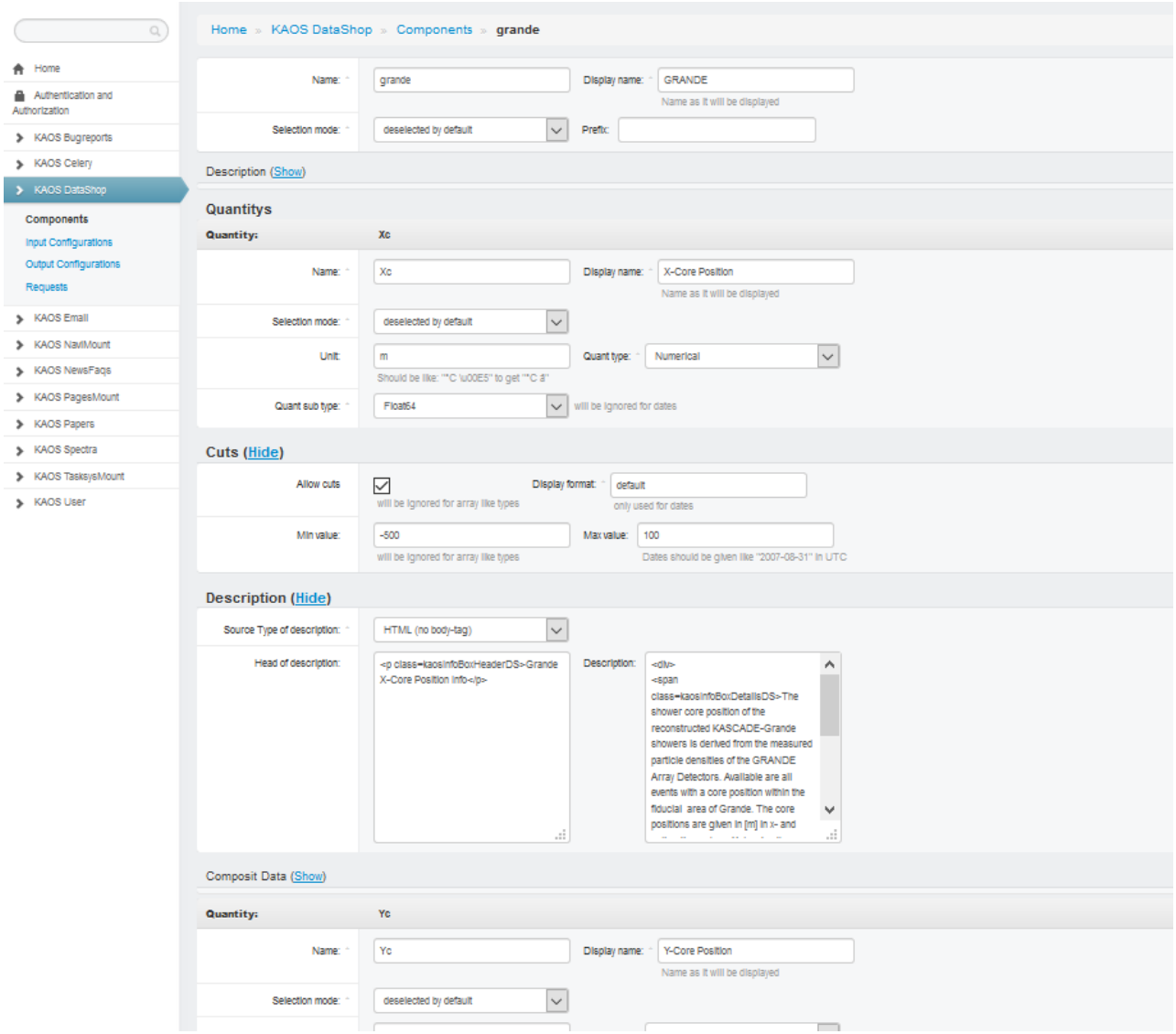


https://kcdc.ikp.kit.edu

past KCDC releases

- 7 major releases for the *KASCADE* DataShop;
- **data from the separate analysis of the 'KASCADE' and 'GRANDE' detectors, the Central Hadron Calorimeter and radio LOPES were published;**
- **first release in Nov 2013, ~158 Mio events, 15 Quantities;**
- with every release we increased the number of events published or added more detector components from KASCADE-Grande;
- for the *KASCADE* DataShop we published:
  - > 433 Mio events,
  - 47 Quantities (like number of electrons, core position, angles etc.) from KASCADE, GRANDE, LOPES, Calorimeter,
  - 9 data arrays (like Energy deposits-, Arrival times etc. per detector station),
  - Stored in mongodb (3TB),
- **all detector components and quantities can be inserted and modified via a web-based 'admin interface';**

KCDC admin interface



new KCDC release PENTARUS

- **A second data shop (*COMBINED*) came with the latest release on 26.5.2020**

  Data from the joint analysis of the 'KASCADE' and 'GRANDE' detector arrays of the KASCADE-Grande experiment were published

- **What's new:**
  - new backend programming to host more DataShops;
  - new components and the quantities are defined in the admin interface;
  - new mongoDB with *COMBINED* data;
  - generate matching simulations for 3 high-energy models (QGSJet-II-04, SIBYLL 2.3c, EPOS-LHC);
  - new Preselections added;
  - new documentations on *COMBINED* DataShop and *COMBINED* simulations written;
  - most of the dynamic and static pages adapted;
  - 'Materials' menu added ; some helpful information including 4 user manuals and some software downloads
  - complete redesign of 'Simulations' and 'Preselections' pages
  - fix data inconsistencies in mongodb of the *KASCADE* DataShop (about 0.01% of the data were corrected due to an uncertainty in the data analysis software KRETA)

KCDC mongodb

- **some numbers for present mongodb's for the two KCDC DataShops**
  - *KASCADE* 'OCEANUS_1'

size:	2927 GB
recorded:	1998 – 2013
events:	433 Mio
components	4 (KASCADE, GRANDE, LOPES, Calorimeter)
Quantities	47
Data arrays	9

  - *COMBINED* 'COMB_1'

size:	128 GB
DataShop	COMBINED
recorded:	2004 – 2010 (KASCADE and GRANDE joint)
events:	15 Mio
components	2 (COMBINED, LOPES)
Quantities	39
Data arrays	9

future perspectives

“we are prepared to add new data sets from other experiments to the KCDC DataShop”

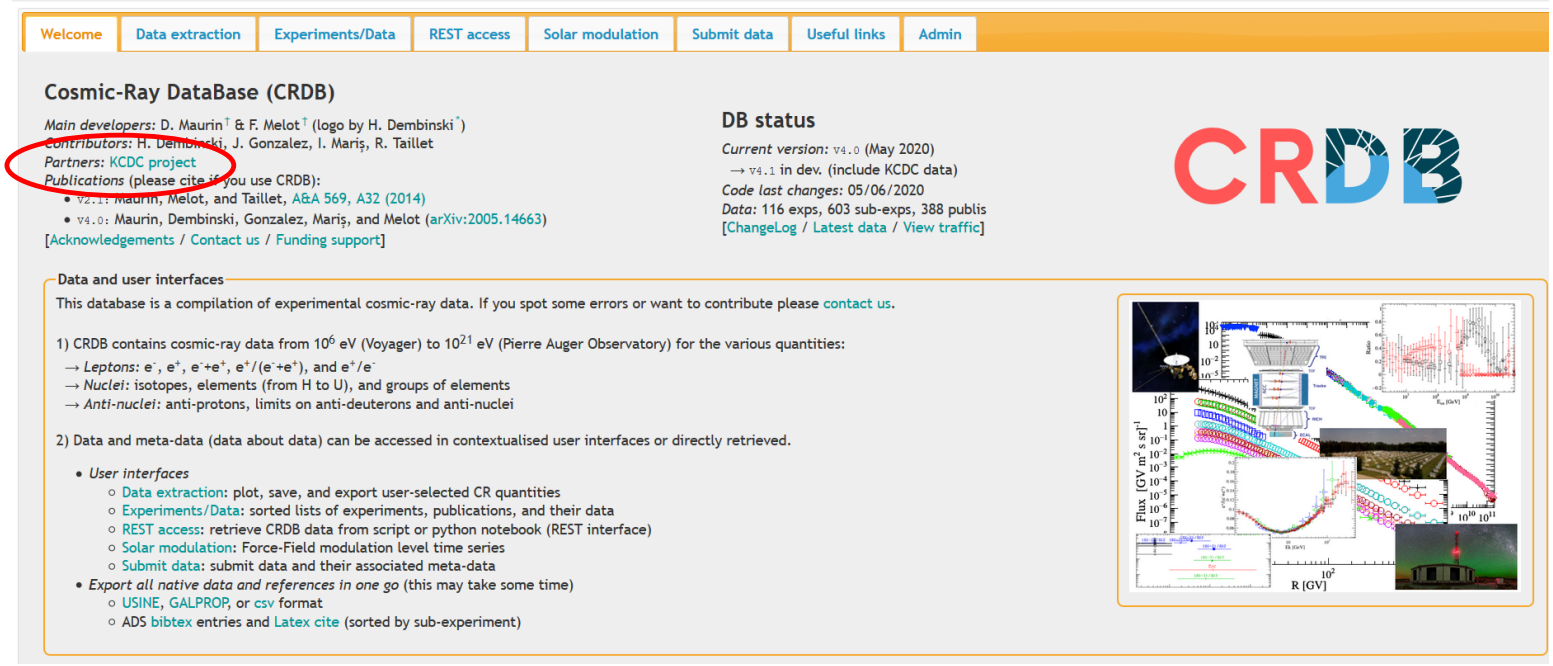
What is needed ?

- **new backend programming enables us to add new DataShops to the present structure within 15 minutes!**
- all DataShop information can be inserted via the web-based admin interface;
- a new mongo database must be filled (requires a filling routine);
- a documentation of the detector and the quantities has to be provided.

future perspectives

More perspectives

- We just started to form a partner project with CRDB around their Cosmic Ray database https://lpsc.in2p3.fr/crdb/



- you can follow our activities on twitter https://twitter.com/kcdc_kit

Thank You !