DITANET

A Joint Initiative for the Development of Beam Instrumentation for Future Particle Accelerators

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Abstract

Without an adequate set of beam instrumentation, it would not be possible to operate any particle accelerator, let aside optimize its performance. In a joint effort between several research centres, Universities, and partners from industry, DITANET aims for the development of beyond-state-of-the-art diagnostic techniques for future accelerator facilities and for training the next-generation of young scientists in this truly multi-disciplinary field. The wide research program covers the development of beam profile, current, and position measurements, as well as of particle detection techniques and related electronics.

DITANET is one of the largest Marie Curie Initial Training Networks and the largest EU education action ever on beam diagnostic techniques. This contribution gives a brief overview of the DITANET partner institutes, and gives some examples from the wide research and training program.

Network Members

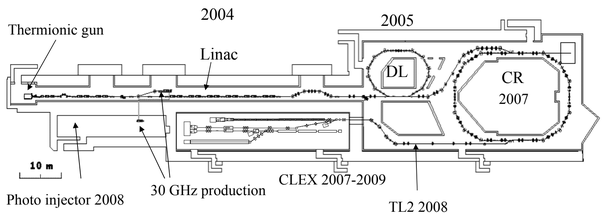
Associated Partners

Research

The accelerator projects that will be covered within DITANET range from the next generation of linear colliders (ILC, CLIC) and the most advanced high energy accelerators (LHC, FAIR), to innovative light sources (X-FEL) and novel low-energy storage ring projects (DESIREE, USR). Only some examples of the research projects within DITANET can be outlined here *(see paper for further details)*.

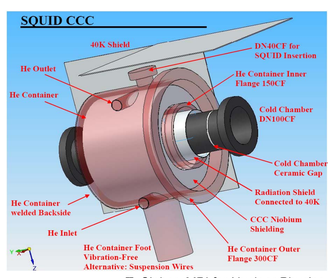
Beam Diagnostics for CLIC

One of the major decisions in particle physics over the next 3 years will be to decide on the next major accelerator to access the TeV energy scale.



The CLIC two-beam acceleration scheme is one of the promising candidates, with the CLIC Test Facility (CTF3) at CERN being the unique facility to test the CLIC acceleration principle and to prove the feasibility of associated RF systems. It is furthermore an ideal testing ground for beyond-state-of-the art beam loss monitors, new longitudinal and transverse beam profile monitors, as well as for cavity-BPMs.

Diagnostic Methods for Low Ion Current at the FAIR Transfer-lines



T. Sieber, MPI for Nuclear Physics

Schematic layout of the SQUID-based cryogenic current comparator.

For the slow extraction from the SIS100 synchrotron the high-energy beam transfer-lines require diagnostic devices for the non-destructive measurement of ion currents down to the nA region. For this purpose, the installation of Cryogenic Current Comparators (CCC) is foreseen, offering a non-intercepting and absolute current measurement.

The basic principle is the determination of the beam's magnetic field using a sensitive SQUID-based magnetic flux detector. This subproject will be realized in collaboration between the University of Jena, DITANET Associated Partner Max-Planck Institute for Nuclear Physics Heidelberg and GSI.

Training

Young researchers participating in the network program will not only get the possibility to perform state-of-the-art research, they will also get a much wider training in the domain of beam diagnostics by interaction with other network participants and close collaboration with associated partners from the industrial sector.

While helping young researchers to put together their individual training plan at each of the institutes, DITANET will also promote a multidisciplinary training in the wider field of beam diagnostic techniques. This responds to the need for strong interdisciplinary skills and expert knowledge in a range of different diagnostic techniques.

DITANET will organize one week courses on beam diagnostic techniques in spring 2009 (London) and fall 2010 (Stockholm) that will be open to all network participants as well as to external participants.

Details on these courses will be published on the DITANET web site

Conclusion and Outlook

The largest ever coordinated EU education action for young researchers in the field of beam diagnostic techniques for particle accelerators has been awarded to a consortium of ten partners from all over Europe within the EU-Marie Curie program for initial training networks.

The joint effort in setting up DITANET and the corresponding administrative and training-related boundary conditions will guarantee a continuous training of young researchers in this field. Close collaboration between the network participants and the associated partners with a very prominent role of industry, ensures that the basis for DITANET is laid in a true international approach with a clear long term perspective.

The network encourages young researchers to apply for one of the vacant positions and invites scientists and institutes to join in to the network's activities.

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