FLOW AND DISSIPATION IN ULTRARELATIVISTIC HEAVY ION COLLISIONS

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ORGANISERS:
Pasi Huovinen (Co-ordinator) (*Frankfurt*), Marcus Bleicher (*Frankfurt*), Carsten Greiner (*Frankfurt*), Peter Petreczky (*BNL*), Raimond Snellings (*NIKHEF*)

NUMBER OF PARTICIPANTS: 41

MAIN TOPICS:

- transport coefficients and equation of state
- relativistic viscous hydrodynamics
- parton and hadron cascades
- measurement of flow
- measurement of two- and three-particle correlations
- ridges and Mach cones

SPEAKERS:

Barbara Betz (*Frankfurt*),
Ante Bilandzic (*Nikhef*),
Ioannis Bouras (*Frankfurt*),
Piotr Bozek (*Krakow*),
Laszlo Csernai (*Bergen*),
Gabriel Denicol (*Frankfurt*),
Andrej El (*Frankfurt*),
ShinIchi Esumi (*Tsukuba*),
Francois Gelis (*Saclay*),
Clement Gombeaud (*Saclay*),
Ulrich Heinz (*OSU*),
Tomoi Koide (*Frankfurt*),
Roy Lacey (*Stony Brook*),
Mike Lisa (*OSU*),
Matt Luzum (*Saclay*),
Mauricio Martinez (*Frankfurt*),
Denes Molnar (*Purdue*),
Akihiko Monnai (*Tokyo*),
Azwinndini Muronga (*Cape Town*),
Marlene Nahrgang (*Frankfurt*),
Harri Niemi (*Frankfurt*),
Chiho Nonaka (*Nagoya*),
Robert Peschanski (*Saclay*),
Andre Peshier (*Frankfurt*),
Hannah Petersen (*Frankfurt*),
Peter Petreczky (*BNL*),
Scott Pratt (*MSU*),
Dirk Rischke (*Frankfurt*),
Yuri Sinyukov (*Kiev*),
Huichao Song (*OSU*),
Derek Teaney (*Stony Brook*),
Giorgio Torrieri (*Frankfurt*),
Josh Vredevoogd (*MSU*),
Sergei Voloshin (*Wayne State*),
Fuqiang Wang (*Purdue*),
Klaus Werner (*Subatech*),
Zhe Xu (*Frankfurt*)

SCIENTIFIC REPORT:

Aim and Purpose: The success of ideal-fluid hydrodynamics in reproducing the observed azimuthal anisotropy of particles produced in heavy-ion collisions at RHIC gave rise to the notion of quark-gluon plasma as a perfect fluid. As a matter with extremely low shear viscosity coefficient to entropy ratio η/s. Since then there has been a great interest in the heavy-ion physics community to measure and determine how large the shear viscosity coefficient actually is, and the there has been a tremendous effort to develope viscous hydrodynamical and parton cascade models capable of describing dissipative processes in heavy ion collisions. In this workshop we aim to summarise what we do know from theory and experiment about the matter at high temperature: degrees of freedom, EoS and transport coefficients. What the present state of development of dissipative hydro and parton cascade is and what we can expect to learn in the near future, especially what are the prospects of achieving quantitative instead of qualitative understanding of hot QCD matter.

Results and Highlights: A general opinion among the participants was that the workshop was very successful with many excellent talks, which provided a state-of-the-art view of the theory and experiment. Among the recurring themes in the talks and discussions were

- The necessity to model thermalization and the possible buildup of flow during thremalization
- The need to check the different formalisms of relativistic dissipative hydrodynamics against kinetic theory, i.e. transport model calculations
- The urgent need to understand the dissipative corrections to thermal distribution functions
- The poorly understood mechanism of hadronization

Conclusions: There has been tremendous development in the viscous hydrodynamics and transport models, but a lot of work still remains to be done before the uncertainties of our models are under control and it is possible to extract the shear viscosity to entropy ratio of strongly interacting matter from the data. Nevertheless, the general opinion was that this task is doable and many new projects and collaborations were initiated.

The talks are available at the websites http://www.ect.it
and http://th.physik.uni-frankfurt.de/ huovinen/ect.html