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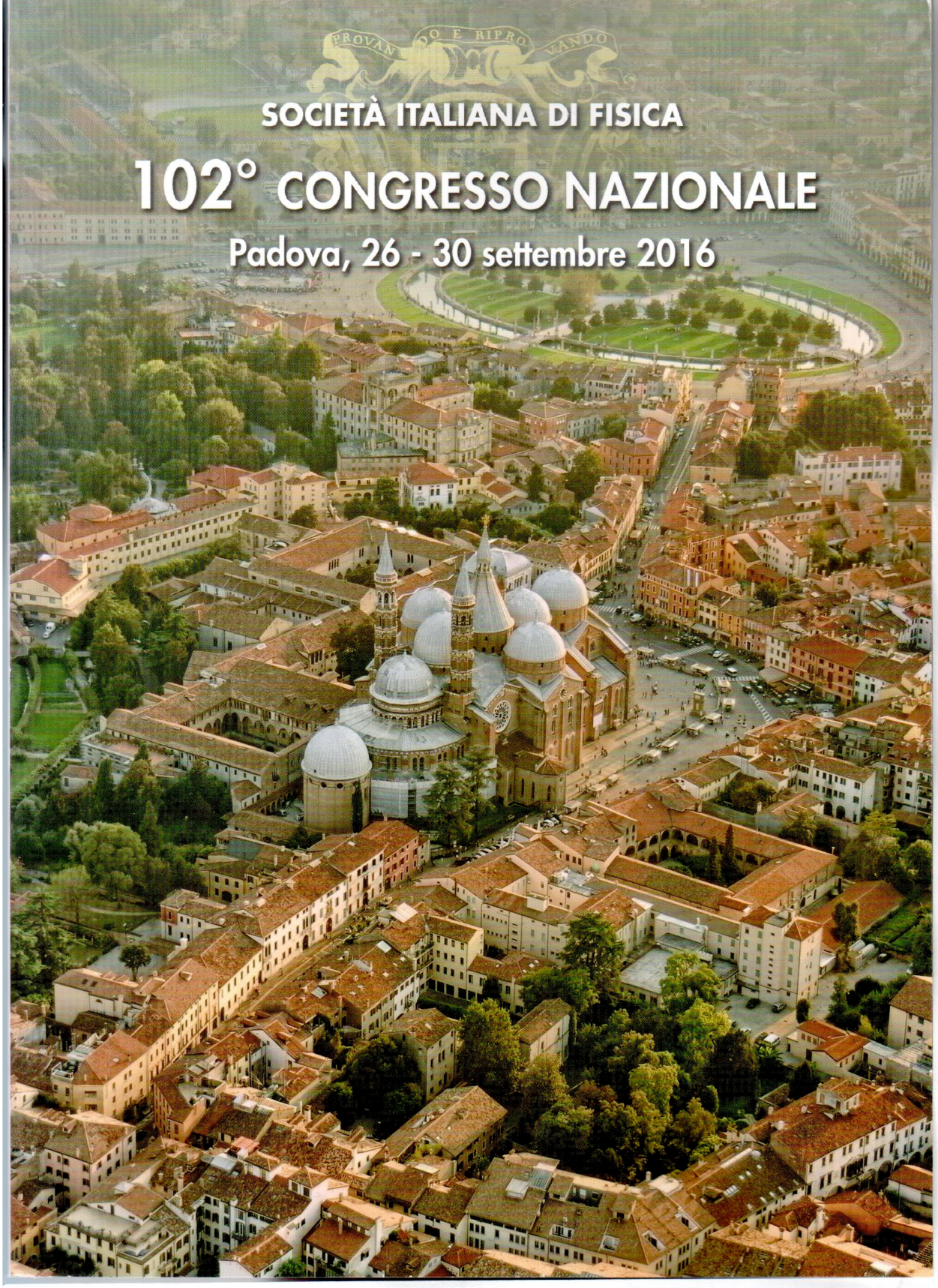
SOCIETÀ ITALIANA DI FISICA

102° CONGRESSO NAZIONALE

Padova, 26 - 30 settembre 2016



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Barbara Alzani - Giovanna Bianchi Bazzi
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Tel.: 051-331554 - Fax: 051-581340 - `sif@sif.it` - `http://www.sif.it`

AMMINISTRAZIONE SIF

Roberta Comastri
Società Italiana di Fisica - Via Saragozza 12 - 40123 Bologna
Tel.: 051-6449144 - Fax: 051-581340 - `comastri@sif.it`

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Transport processes in a time-dependent chaotic magnetic-field configuration.
Grasso D. ([1]), Di Giannatale G. ([1]), Falessi M. ([2]), Pegoraro F. ([3])
([1]) *ISC-CNR, Politecnico di Torino*
([2]) *Dipartimento di Matematica e Fisica, Università di Roma Tre*
([3]) *Dipartimento di Fisica e CNISM, Università di Pisa*
Magnetic-field lines embedded in a plasma confinement system are often char-acterized by a chaotic motion, that can lead to the degradation of the confinement properties of the system. However, even in case of chaotic domains, magnetic bar- riers can emerge and limit the field line motion itself (D. Borgogno *et al.* (2011)). In this paper we analyze the Lagrangian Coherent Structures (LCS) that determine the transport properties of magnetic-field lines in a chaotic magnetic field, generated by a reconnection event (D. Borgogno *et al.* (2005)). Differently from what has been done (D. Borgogno *et al.* (2005)), where the barriers have been found as ridges of the finite-time Lyapunov exponent field, here the LCS are determined as the most attracting and repelling material lines, according to G. Haller (2000). First, following the work of M.V.Falessi *et.al.* (2015), we illustrate the method by a direct comparison of the LCS calculated according to the new defintion and the ones calculated adopting the approach of D. Borgogno *et.al.* (2005), analyzing the Hamiltonian of magnetic-field lines at a fixed -time. Then, we will show how these LCS modify in time, assuming a time-dependent Hamiltonian.

Kinetic quasimodes in a plasma double layer.
Nocera L.
IPCF-CNR, Pisa
We determine the properties of quasimodes in a double layer characterised by a finite-size DC electric field and pressure gradient and hosting 2D electrostatic oscillations, all of which asymptotically vanish away from the double layer. *Ad hoc* closure applied to the inhomogeneous, anisotropic, collisionless plasma, taking into account the contributions by trapped ions and electrons, gives a Fredholm integral equation for the oscillations' amplitude and a logarithmically singular dispersion function. Roots of this function on its non-physical sheet give the frequencies and collisionless (Landau) damping rates of novel quasimodes propagating at right angle to the DC electric field.

Extensions and simulations for a versatile multiaperture negative-ion source.
Veltri P. ([1])([2]), Cavenago M. ([1]), Serianni G. ([2]), Antoni V. ([2]), Barbisan M. ([2]), De Muri M. ([1])([2]), Fagotti E. ([1])([2]), Kulevoy T. ([1])([3]), Pasqualotto R. ([2]), Petrenko S. ([1])([3]), Sartori E. ([2]), Taccogna T. ([5]), Variale V. ([4])
([1]) *INFN, Laboratori Nazionali di Legnaro, PD*
([2]) *Consorzio RFX, Padova*
([3]) *ITEP, Moscow, Russia*
([4]) *INFN, Sezione di Bari*
([5]) *NANOTEC-CNR, Bari*
The operation of the ion source NIO1 (Negative-Ion Optimization 1) developed by Consorzio RFX and INFN gives the possibility of validating simulation models and innovations on an easily accessible Italian installation, with a multiaperture extraction (9 beamlets) as the larger sources (up to 1280 beamlets) developed for heating of fusion plasmas with Neutral Beam Injectors. The related modeling, including particle in cell, fluid and ray tracing codes, is presently aimed at the study of plasma dynamic, negative-ion extraction and acceleration and beam space charge compensation. In this contribution the status of numerical models is discussed and their results compared with measurements at NIO1. Some studies for an energy recovery system are also described.

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