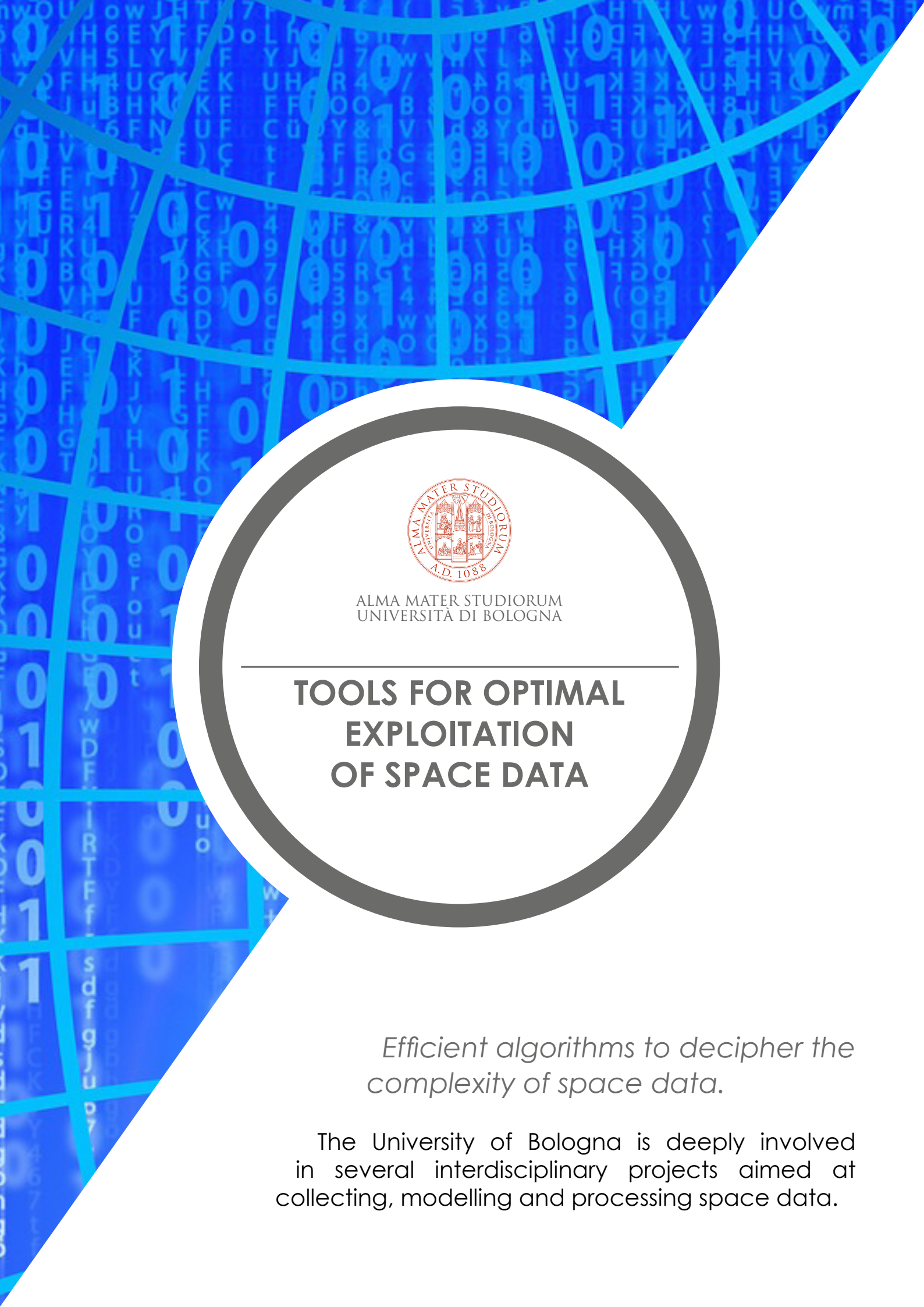

ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA

TOOLS FOR OPTIMAL EXPLOITATION OF SPACE DATA

Efficient algorithms to decipher the complexity of space data.

The University of Bologna is deeply involved in several interdisciplinary projects aimed at collecting, modelling and processing space data.

- Geodetic data (GNSS, SLR, SAR) for crustal deformation studies. Space and terrestrial gravity data. Modelling short- and long-period signals in space geodetic coordinate time series. Sea-level variations. Physical parameters of the ITRS
- Algorithms for space data analysis and modeling to monitor ocean changes. Copernicus Sentinel marine satellite data fusion techniques to reconstruct the ocean state and forecast the ocean weather
- Remote sensing measurements of the atmosphere. Trends of gases regulated by international agreements. Retrieval algorithms for inversion of atmospheric spectral radiances. Diagnostic tools and simulations for studies of new space mission concepts
- Measurements of planet surfaces. Data fusion with visual information from 3D image analysis. Image-based satellite's attitude determination. 2D/3D mosaicing of surface of planets. Multi-sensor remote sensing
- Big Data management and analysis tools for temporal and geographic information retrieval, data integration, predictive models
- Integration of spectroscopic and kinetic databases for Astrochemistry. Quantum-chemical calculations of reactive potential energy surfaces, thermochemistry and kinetics

HIGHLIGHTS

The University of Bologna participates in the Copernicus Academy; in the development of models and data assimilation systems for short-term ocean predictions and climate reconstructions using earth satellite data; in a NASA project for a mm/submm heterodyne sensor for spectroscopy and imaging of cold planetary objects in the outer solar system; in FORUM mission within the ESA Earth Explorer 9 program; in EU-funded projects on sea-level variations in the Mediterranean.

Facilities and infrastructures: Computing facility for the image analysis of planet surfaces; Computing facility for geodetic data analysis; Network of permanent GPS stations for geodesy; Computing facility for the analysis of ocean and marine data; Computing facility for geographic Big Data management; Facility for quantum mechanical calculations (molecules); an Open Physics Hub laboratory for sensors and high-speed computing.

Extensive collaborations are present with primary European companies operating in the space sector and Big Data analysis as well as several institutions and research centers at national and international level, such as: ASI, CNR, ESA, NASA, INAF, INGV, MPE, LAREG, BKG, CMCC; STAR Interuniversity Center for Astrochemistry.