GeoStat is an INRIA project located at INRIA Bordeaux Sud-Ouest (INRIA BSO), inside the theme:

\textit{applied mathematical computation and simulation, optimization, learning and statistical methods}.

The team makes fundamental and applied research in the analysis of complex natural signals using paradigms and methods from Statistical Physics such as: \textit{scale invariance}, \textit{predictability}, \textit{universal classes}

We study the parameters related to common statistical organization in different complex signals and systems, we derive new types of

\textit{sparse} and

\textit{compact representations}

and

\textit{machine learning approaches}.

We are also developing tools for the analysis of complex signals that better match the statistical and geometrical organisation inside these data: as a typical example, we cite the evaluation of

\textit{cascading properties of physical variables}

inside complex signals.

GeoStat's research thematics are centered on the following theoretical developments:

- Signal processing using methods from complex systems and statistical physics,
- Sparse and compact representations, signal reconstruction, machine learning,
- Predictability in complex systems,
- Analysis, classification, detection in complex signals.
and the following applied objectives:

- Analysis of complex and turbulent signals in earth observation, universe sciences and remote sensing.
- Complex dynamics in the analysis of heartbeat signals.
- Speech analysis.
- Super-resolution.
- Non convex optimization methods (3 years contract with i2S company).

Partners:

- **Laboratoire Ondes et Matière d'Aquitaine (Soft matter and Biophysics team), Bordeaux, France**.
- **Laboratoire d'Astrophysique de Bordeaux, UMR CNRS 5804, Bordeaux, France**.
- **Institute for Astrophysics, University of Cologne**. [Link to GENESIS project.](#)
- **ICM-CSIC, Department of physical oceanography, Barcelona, Spain**.
- **LEGOS Laboratory, UMR CNRS 5566, Toulouse, France**.
- **Laboratory of theoretical physics and condensed matter University Paris 6, CNRS UMR 7600, Paris, France**.
- **IRIT, UMR CNRS 5505, Toulouse, France**.
- **IIT Roorkee, India**: since February 2014, GEOSTAT is an associated team with India IIT Roorkee's team of Prof. D. Singh. [Link to associated team "OPTIC" web page](#).

GeoStat is a member of **GDR PHENIX**.

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