ID de Contribution: **8** Type: **Non spécifié**

# Time-delay interferometry as a coronagraph

*lundi 20 novembre 2023 14:20 (15 minutes)*

The Laser Interferometer Space Antenna (LISA) will be a space-borne gravitational wave (GW) detector to be launched in the next decade. LISA is designed to be sensitive to GWs in the mHz band and is expected to observe an unprecedented number of sources: quasi-monochromatic sources as galactic binaries (GBs), transient sources such as massive black hole binaries (MBHBs), extreme mass ratio inspirals, stochastic GW background and potentially unmodeled sources. The richness of LISA data calls for different data analysis approaches. Central to LISA data analysis is time-delay interferometry (TDI), a numerical procedure which drastically reduces otherwise overwhelming laser frequency noise. This procedure is not unique and gives rise to multiple TDI variables. LISA data analysis is usually performed on subsets of TDI variables which form a basis, e.g. Michelson variables $(X, Y, Z)$. We investigate a less standard TDI variable, denoted $\kappa$, which depends on two parameters $(\beta, \lambda)$. For *any* GW source located at sky position $(\beta_\star, \lambda_\star)$, the TDI variable $\kappa$ has the singular property of canceling GW signal when $(\beta, \lambda)$ tend to $(\beta_\star, \lambda_\star)$. This TDI variable has been briefly discussed in the LISA literature [1,2,3], but on theoretical grounds. In order to assess the applicability of this property to LISA data analysis, we evaluate $\kappa$'s response to two types of sources: GBs and MBHBs. First, we conduct a thorough study on GBs evaluating $\kappa$'s sensitivity to changes in GB's parameters such as sky position and frequency. Second, moving towards more realistic applications, we proceed to a similar study on MBHBs. In fact, $\kappa$ could be used to rapidly determine the sky location of a GW source in a model agnostic manner or as veto to distinguish transient GW sources from instrumental glitches.

References

[1] Massimo Tinto and Shane L. Larson. Lisa time-delay interferometry zero-signal solution: Geometrical properties. Phys. Rev. D, 70:062002, Sep 2004. 10.1103/PhysRevD.70.062002.
[2] K. Rajesh Nayak, S. V. Dhurandhar, A. Pai, and J.-Y. Vinet. Optimizing the directional sensitivity of lisa. Phys. Rev. D, 68:122001, Dec 2003. 10.1103/PhysRevD.68.122001.
[3] Jean-Yves Vinet. Physical and algebraical models of lisa. Unpublished, 2007.

**Auteur principal:** COSTA BARROSO, Raissa

**Orateur:** COSTA BARROSO, Raissa

**Classification de Session:** Session 2