

PhD program in Statistics

# DSS Statistics Seminar

## May 19, 2023, 12:00

**In person** Room 34 (CU002 building, 4<sup>th</sup> floor)

**Webinar** [https://uniroma1.zoom.us/j/86881977368?pwd=SWRFc](https://uniroma1.zoom.us/j/86881977368?pwd=SWRFcVFjMDZTa0lXZk05TE1zNm5adz09)

[VFjMDZTa0lXZk05TE1zNm5adz09](https://uniroma1.zoom.us/j/86881977368?pwd=SWRFcVFjMDZTa0lXZk05TE1zNm5adz09)

**Passcode: 432940**

# ABCC: Approximate Bayesian Conditional Copulae

## ***Brunero Liseo***

*Dip. di metodi e modelli per il territorio, l'economia e la finanza  
Sapienza Università di Roma*

Copula models are flexible tools to represent complex structures of dependence for multivariate random variables. According to Sklar's theorem any  $d$ -dimensional absolutely continuous density can be uniquely represented as the product of the marginal distributions and a copula function that captures the dependence structure among the vector components. In real data applications, the interest of the analyses often lies on specific functionals of the dependence, which quantify aspects of it in a few numerical values. A broad literature exists on such functionals, however, extensions to include covariates are still limited. This is mainly due to the lack of unbiased estimators of the copula function, especially when one does not have enough information to select the copula model. Recent advances in computational methodologies and algorithms have allowed inference in the presence of complicated likelihood functions, especially in the Bayesian approach, whose methods, despite being computationally intensive, allow us to better evaluate the uncertainty of the estimates. In this work, we present two Bayesian methods to approximate the posterior distribution of functionals of the dependence, using nonparametric models which avoid the selection of the copula function. These methods are compared in simulation studies and in a realistic application in astrophysics.

Joint work with Clara Grazian and Luciana Dalla Valle.



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