



## On asteroid impact risk analysis using short-arc data

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We discuss the asteroid collision probability analysis when the observational data of the object is very limited (in number and/or coverage). The impact risk is today actively monitored, both through observations and numerical analysis, and several objects having nonzero probabilities for an Earth impact are discovered each year. This activity has led to the elimination of most impactor candidates discovered so far thanks to coordinated follow-up observations, but has also raised discussion on the difficulties faced in analysing newly discovered objects.

Recent advances in the underlying problem of asteroid orbit computation have enabled advances also in the analysis of impact risk, starting from the discovery night data. Near-Earth asteroid 2004 AS<sub>1</sub> was discovered in January 2004 and posed, for one day, the highest and most immediate impact risk so far recorded. The case of 2004 AS<sub>1</sub> highlights the need to understand the problems connected with the statistical analysis of short-arc data. We discuss topics such as the importance of realistic observational error modelling and the invariance of nonlinear statistical analysis.