

A probabilistic action catalogue for *Gaia* DR2

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ABSTRACT

Understanding the chemical and dynamical evolution of the Galaxy requires an understanding of the orbital properties of stars, but the high dimensionality of phase space makes this difficult. For this reason, many authors have explored the possibility of using actions, which in principle reduce the six-dimensional phase-space information into three dimensions, for many purposes in understanding the Galaxy. We present a fully probabilistic action catalogue for every star with a radial velocity in *Gaia* DR2, as well as for stars with radial velocities from the APOGEE, RAVE, . We present a separate catalogue for each of these surveys.

Key words: Galaxy: disc – Galaxy: kinematics and dynamics – stars: kinematics and dynamics

1 INTRODUCTION

This is a simple template for authors to write new MNRAS papers. See `mnras_sample.tex` for a more complex example, and `mnras_guide.tex` for a full user guide.

All papers should start with an Introduction section, which sets the work in context, cites relevant earlier studies in the field by ?, and describes the problem the authors aim to solve (e.g. ?).

2 METHODS, OBSERVATIONS, SIMULATIONS ETC.

Normally the next section describes the techniques the authors used. It is frequently split into subsections, such as Section 2.1 below.

2.1 Maths

Simple mathematics can be inserted into the flow of the text e.g. $2 \times 3 = 6$ or $v = 220 \text{ km s}^{-1}$, but more complicated expressions should be entered as a numbered equation:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}. \quad (1)$$

Refer back to them as e.g. equation (1).

2.2 Figures and tables

Figures and tables should be placed at logical positions in the text. Don't worry about the exact layout, which will be handled by the publishers.

Figures are referred to as e.g. Fig. 1, and tables as e.g. Table 1.

Figure 1. This is an example figure. Captions appear below each figure. Give enough detail for the reader to understand what they're looking at, but leave detailed discussion to the main body of the text.

Table 1. This is an example table. Captions appear above each table. Remember to define the quantities, symbols and units used.

A	B	C	D
1	2	3	4
2	4	6	8
3	5	7	9

3 CONCLUSIONS

The last numbered section should briefly summarise what has been done, and describe the final conclusions which the authors draw from their work.

ACKNOWLEDGEMENTS

The Acknowledgements section is not numbered. Here you can thank helpful colleagues, acknowledge funding agencies, telescopes and facilities used etc. Try to keep it short.

APPENDIX A: SOME EXTRA MATERIAL

If you want to present additional material which would interrupt the flow of the main paper, it can be placed in an Appendix which appears after the list of references.

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