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ASTR500: Mock Cumulative Exam Question #2

Where Are the Old-Population Hypervelocity Stars? (Kollmeier & Gould 2007)

3rd February, 2009 – Adam McKay

The authors say that one of their simplifying assumptions is to assume that $r = R$. Let's explore this.

- a) The authors define coordinates l and b for their fields. What is meant by l and b ?
- b) Derive equation 3.
- c) For a given R_0 and r , find the angle α (see below) for which the correction term is zero, i.e. when $r = R$.

You may wish to use the law of cosines to rewrite R in terms of r and R_0 . Also, note that $\cos l \times \cos b$ can be written as the cosine of one angle, call it α , equivalent to the angle between the point (l, b) and the origin of the coordinate system. A figure should be helpful in clarifying your work.