American Association of **Physics Teachers**

	Slavomír Tuleja's POSTER from the AAPT Topical Workshop Teaching General Relativity to Undergraduates Held at Syracuse University, July 20-21, 2006

Orbits of particles and light around non-spinning and spinning black holes

(click below on the poster for the full sized pdf version)

[Slavomír Tuleja](#)

An interactive JAVA program plots orbits of test particles and light flashes in the equatorial plane of a non-spinning (Schwarzschild) and a variable-spin (Kerr) black hole. The software displays either the time-development of an orbit or the entire orbit over extended time. In the latter case the orbit changes instantly and continuously as the operator varies initial conditions. For the spinning Kerr black hole, the display shows the ergosphere (in which no particle can remain at rest) as well as the outer horizon and inner (Cauchy) horizon. The operator can use alternative global coordinate systems appropriate to the given black hole: Schwarzschild, Boyer-Lindquist, Gullstrand-Panlevé, and Doran. The interactive time-dependent display complements the static, analytic presentation of textbooks.

[wiki](#)

[review](#)

Latest version of **GRorbits** program and may be downloaded from the dropsite http://www.eftaylor.com/grsoftware/. The dropsite also contains the [READMEgrobrits.pdf](#) file and some background material.
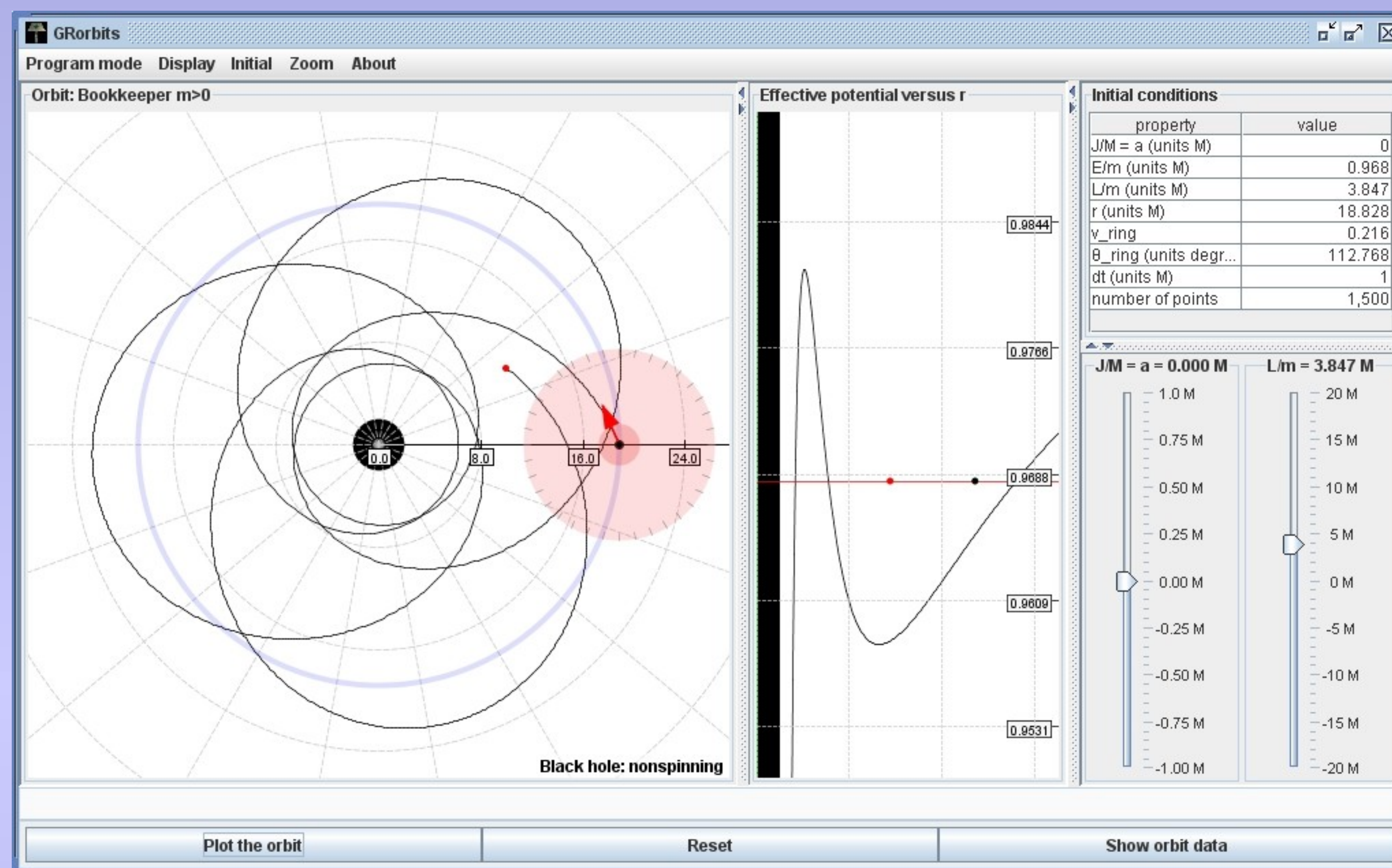
Java software by
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ORBITS OF PARTICLES & LIGHT AROUND NONSPINNING & SPINNING BLACK HOLES

SCHWARZSCHILD
(NONSPINNING) BLACK HOLE

KERR
(SPINNING) BLACK HOLE

DATA EXTRACTION

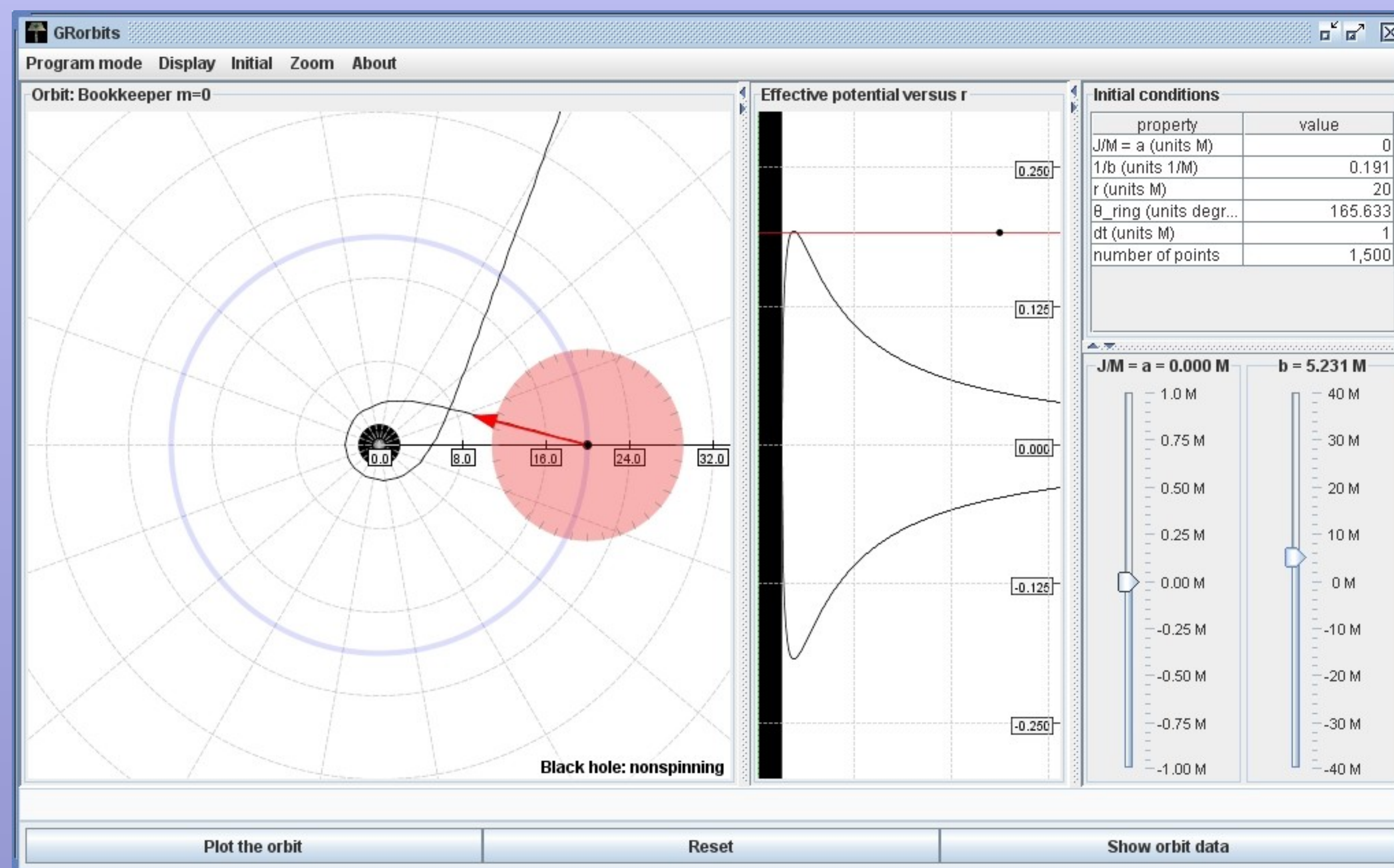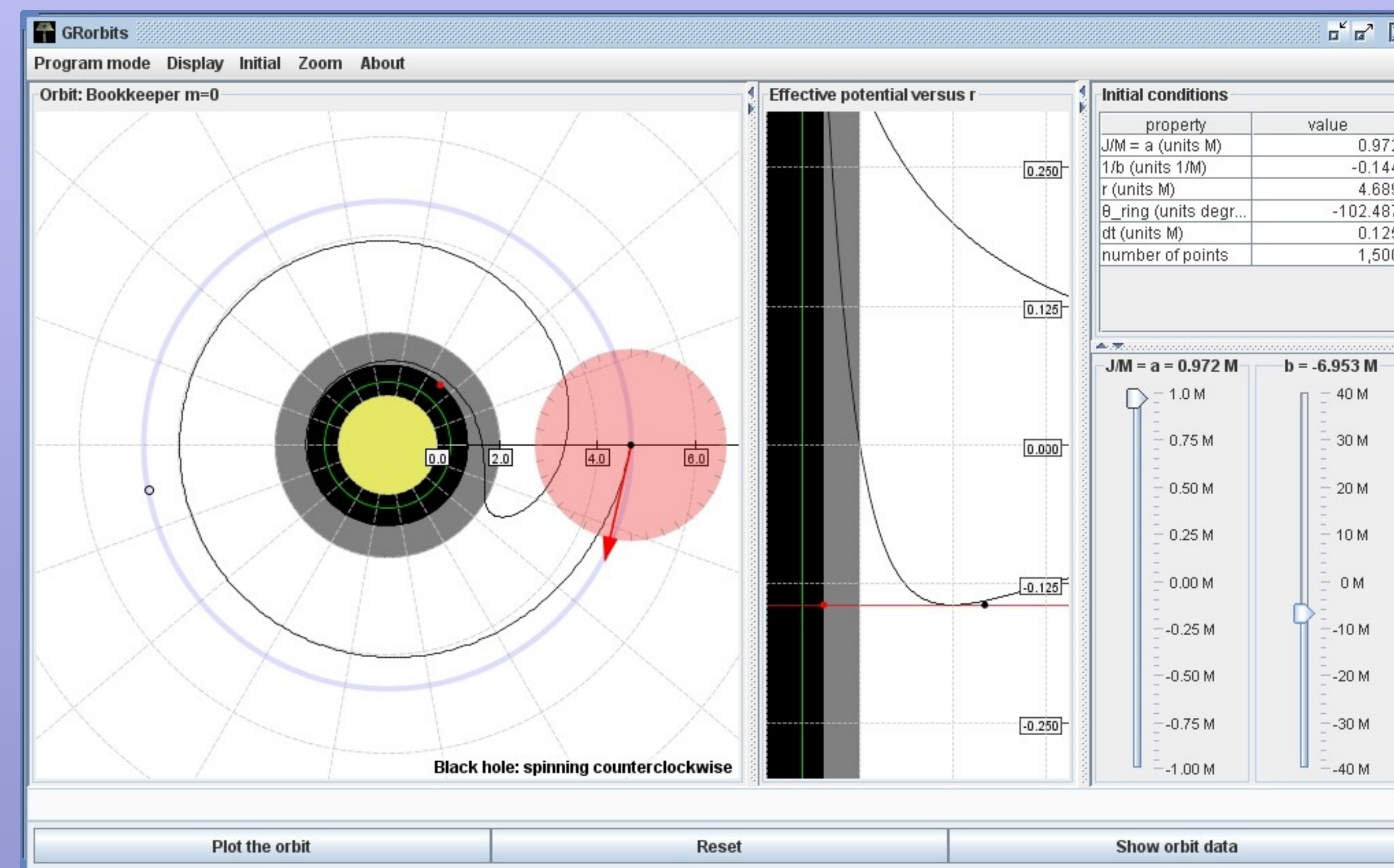### ORBITS OF STONES

ORBITS OF STONES
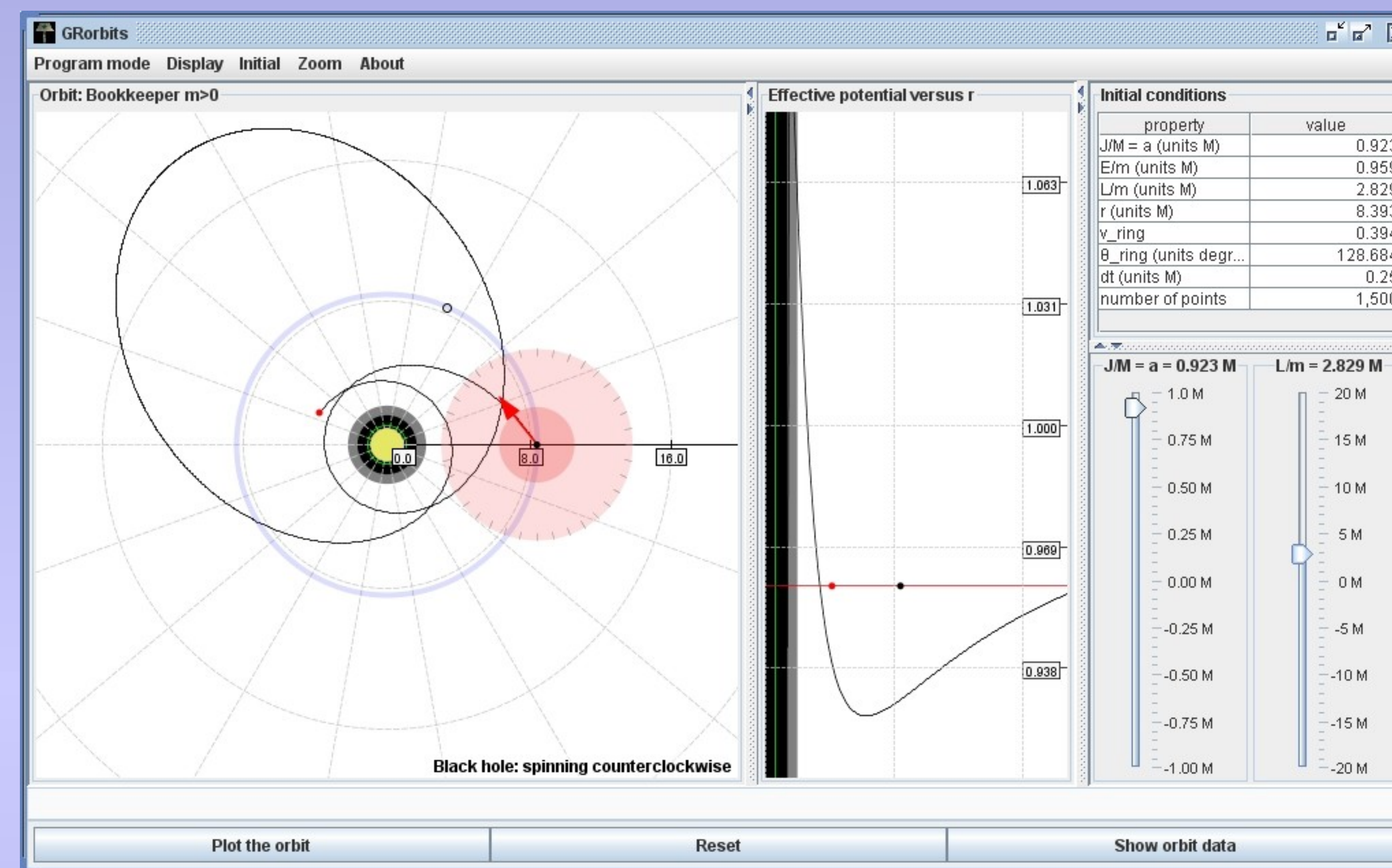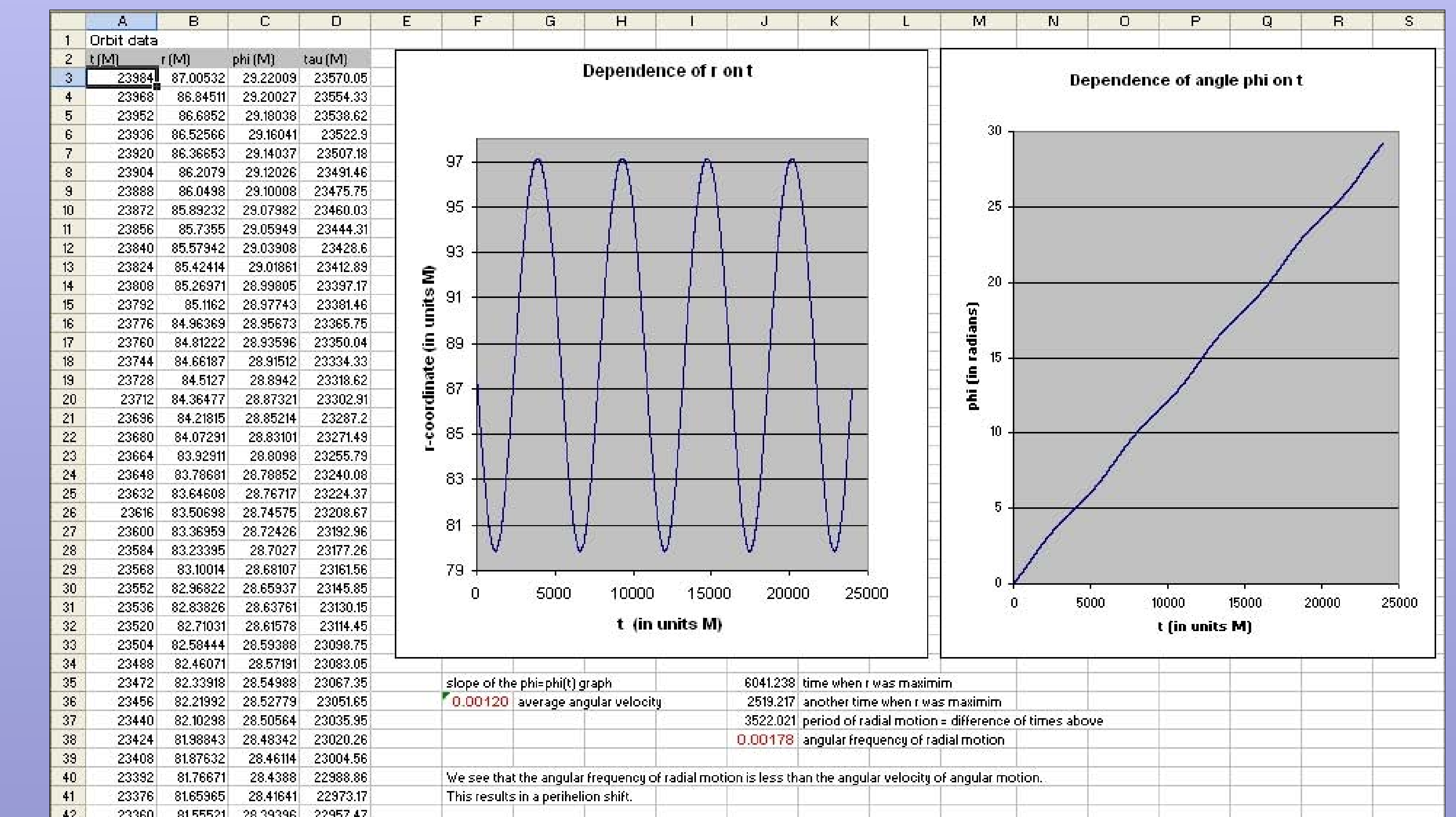
ORBIT PRECESSION
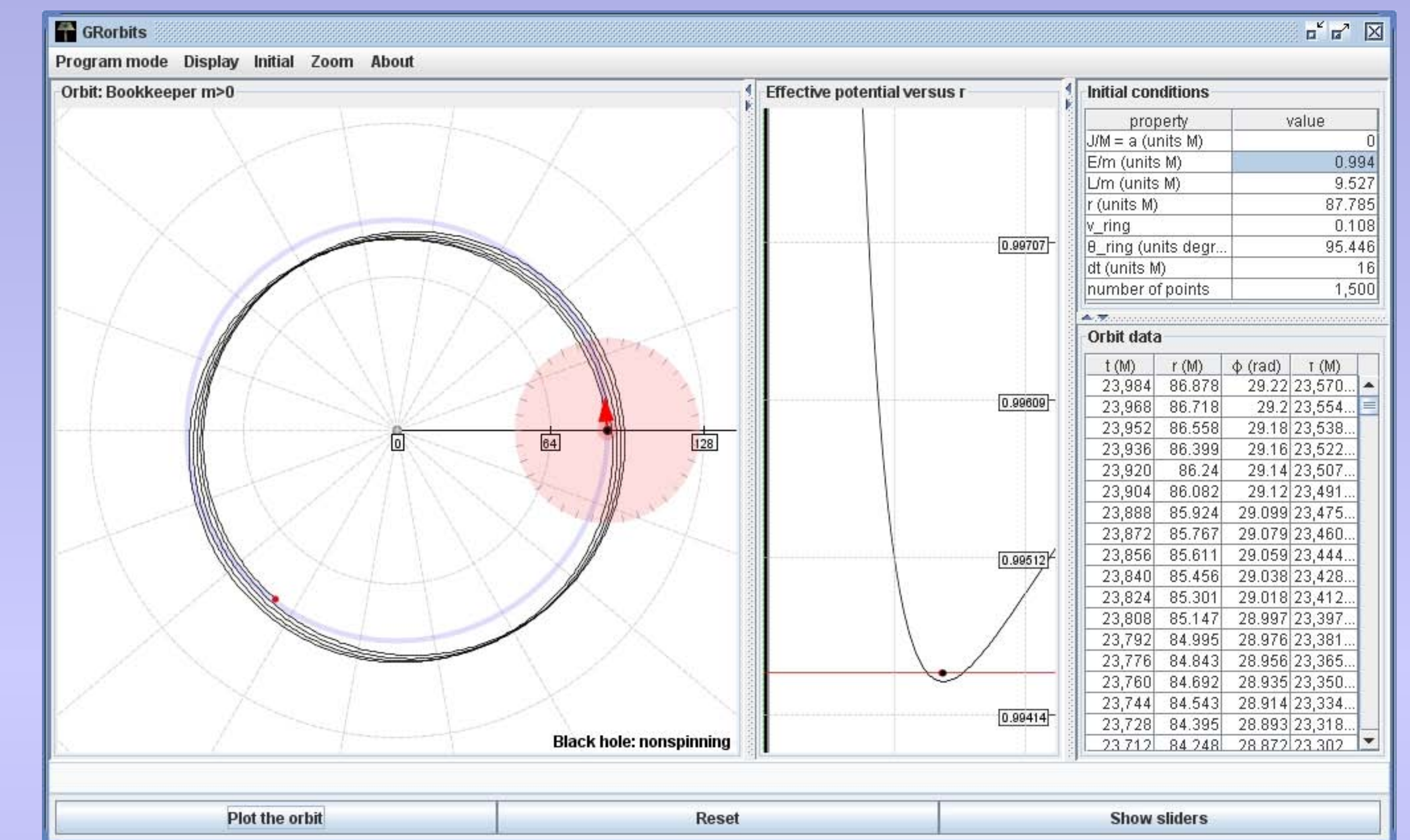
ORBITS OF LIGHT

ORBITS OF LIGHT

GRAPHING THE DATA IN EXCEL

JAVA RUNS ON ALL COMMON PLATFORMS: