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Author(s):	H.O. Funsten, F. Allegrini, G.B. Crew, R. DeMajistre, P.C. Frisch, S.A. Fuselier, M. Gruntman, P. Janzen, D.J. McComas, E. Möbius, D.B. Reisenfeld, E.C. Roelof, and N.A. Schwadron
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The Circularity and Stability of the IBEX Energetic Neutral Atom (ENA) Ribbon

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The first sky map of energetic neutral atoms (ENAs) from the outer heliosphere measured from the Interstellar Boundary Explorer revealed the ribbon, a remarkable circular arc of enhanced ENA emission [McComas, et al., 2009] narrow in width [Fuselier, et al., 2009] and centered at ecliptic coordinate $(\lambda,\beta)=(221°,39°)$ [Funsten et al., 2009]. The ribbon is a key signature for understanding the interaction of the heliosphere and the interstellar cloud through which we are moving [McComas, et al., 2009; Schwadron et al., 2010]. At each energy passband of the IBEX-Hi neutral atom imager, we compare the circular metrics of the ribbon in the different ENA sky maps, including the ribbon center, opening angle from the ribbon center to the ribbon, and ribbon circularity. The values of these parameters do not systematically change between maps within statistical uncertainty, suggesting that the dynamics that govern the ribbon structure do not vary on a global scale over the time frame of the maps. Assuming the ribbon ENAs of all energies originate from the same source, the time of travel of lower energy ENAs is nearly twice that of higher energy ENAs measured by IBEX. Thus, because the lower energy ions are characteristic of the ribbon structure earlier in time than the higher energy ions, we infer that this stability extends over a longer time period than that used to acquire the maps.

paul.janzen@umontana.edu; dan.reisenfeld@umontana.edu; fallegrini@swri.edu; gbc@space.mit.edu; Bob.DeMajistre@jhuapl.edu; frisch@oddjob.uchicago.edu; Stephen.A.Fuselier@lmco.com; mikeg@usc.edu; DMcComas@swri.edu; eberhard.moebius@unh.edu; Edmond.Roelof@jhuapl.edu; nschwadron@guero.sr.unh.edu

[(1)] *Los Alamos National Laboratory, Los Alamos, NM 87545, USA*

[(2)] *Southwest Research Institute, San Antonio, TX 78228, USA*

[(3)] *University of Texas at San Antonio, San Antonio, TX 78249, USA*

[(4)] *Massachusetts Institute of Technology, Cambridge, MA, 02139, USA*

[(5)] *Applied Physics Laboratory, Johns Hopkins University, Laurel, MD 20723, USA*

[(6)] *University of Chicago, Chicago, IL, 60637, USA*

[(7)] *Lockheed Martin Advanced Technology Center, Palo Alto, CA 94304, USA*

[(8)] *University of Southern California, Los Angeles, CA 90089-1192, USA*

[(9)] *University of Montana, Missoula, MT 59812, USA*

[(10)] *University of New Hampshire, Morse Hall, Durham, NH 03824, USA*