

Interactive comment on “Observational support for the electron mirror mode: AMPTE-IRM and Equator-S measurements in the magnetosheath” by Rudolf A. Treumann and Wolfgang Baumjohann

Anonymous Referee #1

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Review of “Observational support for the electron mirror mode: AMPTE-IRM and Equator-S measurements in the magnetosheath” by Treumann and Baumjohann As the title implies, this paper is intended to be an observational paper demonstrating the existence of electron mirror modes. I find the observations far from convincing. There is no confirmatory plasma data showing that the plasma pressure is out of phase with the magnetic pressure. Also there is no “string” of mirror mode structures, giving clear evidence of the scale of the structures. Only a few isolated cases have been shown. I suggest that the authors find better examples for observational evidence? The authors have also not addressed why the electron anisotropy would not be absorbed by the electromagnetic whistler mode “lion roars” instead of by the electron mirror mode

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instability. Thus from a theoretical point of view, electron mirror modes would not be expected. The Noreen et al. 2017 reference that the authors quote imply that electron mirror modes would be quenched at very low amplitudes and not be observable. The authors need to address this issue as well. It should be noted that Noreen et al. did not address the issue of the electron free energy being taken up by the whistler mode instability. The authors should add the many references to the ion mirror mode and lion roars, at least the fundamental ones. Some are: JGR, 81, 2261, 1976; JGR, 87, 6060, 1982; JGR, 103, 4615, 1998. On line 11, I suggest the deletion of Chandresekhar et al., 1958 because of a sign error. I suggest the addition of Phys. Fluids, 12, 2642, 1969 which establishes the nonoscillatory nature of ion mirror modes. Line 12, the authors should note that the “kinetic theory” is essentially the same as the fluid theory formulation.

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