

## ***Interactive comment on “Warm protons at comet 67P/Churyumov-Gerasimenko – Implications for the infant bow shock” by Charlotte Goetz et al.***

### **Anonymous Referee #3**

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This paper has analyze the data from multiple instruments observations upstream and downstream of the infant bow at the comet CG when the production rate is intermediate. The results are interesting and in my view is worth publishing after some minor changes. Comments and suggestions are listed below.

Major comments: 1. Near Line 70, in this paper you are mainly exploring the characteristics in the data when the spacecraft crossed the infant shock. Can you also briefly mention and cite some references on what the data will be like if an ordinary or classical shock is crossed, so that readers can easily see the similarities and differences between the infant shock and the ordinary shock.

Minor comments: 1. Line 2: after "infant bow shock" add "(IBS)".

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2. Line 25: "and with it the amount of ice" -> "with increasing amount of ice"
3. Line 40: lower gyroradii -> smaller gyroradii
4. Line 49: "the comet's, frame of reference" -> "the comet's frame of reference"
5. Line 66: "insure" -> "ensure"
6. Line 74: "it's characteristics" -> "its characteristics"
7. Line 119: "instead" -> "because" ?
8. Line 138: by-eye inspection -> inspection by eyeball ?
9. Line 159 & 160: "Interestingly, the flux diminishes at the same time that the proton energy increases gradually." Can you add some theoretical explanation to this phenomena?
10. Line 163: the angle between the x-axis and magnetic field -> the angle between the x-axis and electric field?
10. Line 166: Does spacecraft attitude mean spacecraft orientation? Can you explain what are  $\alpha_{\{x,y,z\}}$  of the spacecraft attitude?
11. Line 173: "we find that the energy of the electrons is almost always increased". Is it consistent with your expectations? Can you add explanation the increase of electron energy and decrease in ion energy?
- 12 Line 201: below than above unity -> below unity?
- 13 Line 244: The statement "at least some of this discrepancy might be attributable to the inability of the flux at 60eV or 120eV to accurately represent the electron spectra" is not clear to me. Can you elaborate this point?

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