

## ***Interactive comment on “Muon radiography for exploration of Mars geology” by S. Kedar et al.***

### **Anonymous Referee #2**

Received and published: 11 January 2013

The work is a good paper outlining all the peculiar aspects to apply the muon radiography to the Mars geology. The aspects are discussed rather in detail and the results which can be achieved are described. The past experiences done on earth by the group is important to understand the problematics on Mars. So I support the the publication of the paper. I have anyhow some points that would need some more details or additional comments, the most important been related to the reduced filter of the Mars atmosphere.

Here in the following the list of points:

Points on pag 831(rows 5): mistyping “on the order” correct to “of the order” or take off “on the order of”

Points on pag 831(rows 12-15): (4) you introduce the concept of “passive” detector (and also “active” below): it is not well clear the meaning you attribute to this word.

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So somewhere in the introduction has to be described a passive detector to better understand the paper.

Points on pag 831(rows 29): “weakly” generate confusion since the muon interactions with matter are “electromagnetic” (i.e. Ionization). I suppose it means that muons do not have hadronic interactions so their range is well related to the energy.

Points on pag 833(rows 14 and following): it is not clear if the numbers on table 1 come from Earth data or from simulation. I suppose are data from Earth but why not to compute the flux via Montecarlo with the right atmosphere? This could be very useful (or necessary) to deeper understand the problem of background(see next point).

Points on pag 833(rows 25 and following): The analysis of how to reject the background is correct but, I think, should be more complete. Muons and hadrons are well mixed in all the directions and muons are few respect to all the hadrons. It seems you have not considered the vertical hadrons interacting with the rock nearby the detector and generating al lot of pions in all the directions, including the horizontal one. So the method proposed to filter hadron using their interations in the detector could be too poor especially if the iron interaction lenghts are few for reducing the weight. Since this a crucial point for the success of the radiography, it would be better to be more quantitative on the background level reachable after the cuts and if or how its presence affects the result. Alternatively you could estimate at which background level the result loses it validity.

Points on pag 835(rows 7): also here “passive. The separation backward/foreward direction implies “active” elements like PMT’s .

Points on pag 835(rows 22): I suppose the spatial rover track is well known otherwise the spatial reconstruction mixing several viewpoints is impossible. Add a comment on this point.

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Interactive comment on Geosci. Instrum. Method. Data Syst. Discuss., 2, 829, 2012.

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