

July 9, 2018

Title:ApJ - Discovery of An ionizing Radiation Field in the Universe, AAS11467

Dear Dick,

I have received a report from the referee on your manuscript cited above. A copy of the report is appended below.

The referee finds some significant problems with your manuscript and recommends against publication. They object to some of the language you used, but also to the idea of drawing such sweeping conclusions from a spatially varying signal of uncertain origin.

In view of the referee's assessment of your manuscript, we will not be able to accept this manuscript for publication in The Astrophysical Journal. I hope that you find the comments of the referee helpful.

Regards,
Ethan T. Vishniac
AAS Editor-in-Chief
Johns Hopkins University

Referee Report

Reviewer's Comments:

I have read, and re-read, the manuscript several times.

The introduction states "We present these observations once again in the present paper because of their, we believe, extreme importance, both for astronomy, and for fundamental physics".

This adds nothing of value.

The authors then state:

We furthermore propose a simple and definitive test of these photons' physical origin through observations using the Alice ultraviolet spectrometer (Gladstone, Stern, and Pryor 2013) aboard the New Horizons spacecraft now beyond Pluto, to (we hope and expect), with Alice's 10°A spectral resolution, rule out any possibility that the radiation is dust-scattered starlight, or instrumental scattering of the light of off-axis bright OB stars.

This is not a report of new data but a hope that an outcome the authors would prefer will be found.

The next section has history and concludes:

"The question now becomes, what fraction of the total diffuse ultraviolet background comes from dust-scattered starlight, and what fraction comes from the unknown second source? We will be pointing out below the practical possibility of making simple and definitive future observations that can easily distinguish between dust-scattered starlight and any other sources for the UV background."

The next section contains an analysis of some old data. I do not agree with several steps in this analysis, but as will be discussed below, this is not relevant.

The authors then make the following strong statement:

"We see that the brightness falls abruptly and dramatically longward of about 1200°A , calling for a truly remarkable physical source for the radiation-thus once again suggesting the probability that we are seeing dark matter decay. "

No justification for the astounding claim that this is dark matter decay is provided.

The next section examines the data and the authors conclude:

"We have recently critically reassessed (and confirmed) our determination of the requirement for an unknown second component for the GALEX FUV background (Akshaya et al. 2018). The question now becomes, what fraction of the total diffuse ultraviolet background comes from dust-scattered starlight, and what fraction comes from the unknown second source?"

If there is a second component (not proven), this is indeed the question.

The authors then conclude:

"The principal purpose of this paper is to draw attention to the fact that conclusive evidence would be easy to obtain if we could make simple observations with the Alice ultraviolet spectrometer aboard the New Horizons mission, which is now well past the planet Pluto and is therefore relatively free from the grating-scattered solar Lyman α that would otherwise be a serious impediment to such measurements. We hope very much that such measurements will be made shortly after the 2019 January 1 New Horizons investigation of Kuiper belt object 2014 MU69. A few long integrations with Alice at the Galactic poles and some lower Galactic latitude locations would confirm-or not-the discovery that we are convinced that we have made."

So the authors acknowledge that no conclusive evidence has been obtained, and the results presented here are conjectural.

Their very final statement is telling:

"locations we have identified where strong diffuse ultraviolet emission is somehow (new physics) being generated. Until that day our conclusion must remain a guess-but we think it is a good one. "

The authors may think their guess is a good one, but with no conclusive evidence and the requirement of new physics, I think many will disagree.

I suggest this paper be withdrawn, and the manuscript be re-written as a proposal to use the Alice spectrometers to search for an added component to the far UV background. I suggest that the odd philosophical notes and statements that the source of this radiation is decay of dark matter be omitted from the proposal. The possibility that it might be the decay of dark matter might be the source of the reionization of the intergalactic medium could be suggested but the authors should then explain how this would be reconciled with existing claims that the source of this reionization has already been found.