Dear Editor of Physics of Plasmas,

we are presently resubmitting our manuscript

MS #POP19-AR-58809
"Spatio-temporal behavior of magnetohydrodynamic fluctuations with
  cross-helicity and background magnetic field,â€
by R. Lugones, P. Dmitruk, P.D. Mininni, A. Pouquet, and W.H. Matthaeus.

We are glad to see that both referees recommend publication of our manuscript,
and recommend minor changes. In the present version we took into account all
refereesâ€™ comments, and also addressed the comments from the Editorial Office.
Concerning these comments, we now provide ReVTeX sources, we added postal
codes to all affiliation addresses, and we filled the e-copyright.

Below we provide detailed answers to the referees, with a list of changes. We
thank you and the referees for the careful handling and reading of the
manuscript, which we believe has improved as a result. We thus hope this new
version of the manuscript will be found suitable for publication in your
journal.

Yours sincerely,

Rodrigo Lugones,
on behalf of all authors.

Reply to Referee #1

> The paper deals with MHD turbulence in presence of cross-helicity and
> background magnetic field. A set of 3D numerical simulations are exposed
> to study the spatio-temporal behavior of the primary variables called
> Elsasser variables. The authors compare the correlation time with the
> typical times provided by the mhd turbulence theory. They also discuss the
> reflection of Alfven waves produced by inhomogeneities.
> The paper is well written and provides significant results on plasma physics
> that can be published as is. I have however minor comments that the authors
> should take into account to improve the presentation.

We thank the referee for his/her comments, which helped us improve the
presentation of our results. Below we provide a list of changes introduced
in the text.

> Page 2: it is not immediately clear if the authors simulate Eqs 1 & 2 or

> Eqs 7-10. The authors should clarify this point. When I read the paper the
> reason to talk about inhomogeneities was not immediately clear.

We clarified which equations were used for the simulations in the first sentence of Sec. II.A ("The MHD equations ... as solved in the numerical simulations are..."). We now also state explicitly we solve Eqs. (1) and (2) at the beginning of Sec. II.C (Numerical simulations). Finally, we added a sentence before Eq. (7) to motivate the discussion on inhomogeneities.

> Eq. 2 : Is P the total pressure?
Yes. This is now clarified in the text after Eq. (4).

> Page 4: since 18 simulations are made it would be relevant to provide a
> Table with information about it.

We added a table with the list of all numerical simulations performed and their relevant parameters in Sec. II.C (see table 1).

> Page 5: the omega-k spectrum is plotted for k_\per=0. Why this value?
> Do the results change with another choice of k_\perp?

We show spectra for k_\perp = 0 for convenience, as other values of k_\perp display the same behavior. We now clarify this in the text in the first paragraph of Sec. III.B ("...other slices, with other values of $k_\perp$, display the same behavior for the waves reported below...").

> Page 12: 'the correlation function decays to 1/e. What does it mean?

We define the decorrelation time as the characteristic time for the decay of the correlation function. We verified that the choice of using the time in which this function decays to 1/e, or other possible choices, does not affect the results. This is now explained in the first paragraph of Sec. III.C (see the text "Note the choice of 1/e as a reference value is arbitrary, but similar results are obtained if instead the decorrelation time is defined as the half width..."). We now also provide two references discussing other definitions for the decorrelation time.

> After Eq 20: a comparison should be made with eg. Rappazzo et al. (ApJ,
> 2007). The authors should also add a reference paper on weak Alfven wave
> turbulence.

We added a reference to Rappazzo et al. (2007), and a reference on weak turbulence theory to Galtier et al. (2000).

> Typo:
> Page 4, Part III, third paragraph: 'Ã§'; same sentence: 'illustration
> the spectral'
> Page 10 (right): 'the total mean field a fluctuation sees'; please correct
> this sentence.
> Page 13 (bottom): inhomengeneities

We corrected all typos.

Once again, we thank the referee for his/her careful reading of the manuscript.

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Reply to Referee #2

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> The paper studies the properties of MHD turbulence with cross-helicity
and
> guide magnetic field using direct numerical simulations. In my opinion,
the
> paper is a valuable extension of previous studies in this area. I can
> recommend this paper for publication in Physics of Plasmas after the
> following points are clarified:

We thank for referee for his/her positive comments. Below we provide
answers
to all referee's requests.

> 1) The authors say (in section II.B): "The Fourier transform in the time
> lag of the scale-dependent correlation function results in the
> wavenumber-frequency spectrum". Can they elaborate on that and show
> explicitly how energy spectrum is related to correlation function?

We now explain that this property follows directly from the Wiener-Khinchin
theorem, stating the theorem explicitly, and providing references with
further
details (see the new discussion before Eq. 15).

> 2) How are energy spectra E(k_perp) and e(k_perp,k_par) presented in
> section III.A calculated? Are they results of the Fourier transform of
> correlation function?

Although they can be computed as the referee indicates, it is more
practical
to compute them directly from the raw numerical data using FFTs. We now
provide in the text explanations on how the different energy spectra were
calculated, in Eqs. (18), (19), and (20), and in the text introducing these
equations.

> 3) In Fig. 2(a) with B0=0, the energy spectrum is not isotropic (contours
> in k_per-k_par plane are not circular). Why is that?

The referee is right, contours are not perfectly circular. This is because
of statistical fluctuations in the flow, that can prefer one large-scale
mode or another for relatively long times, and the spectra we show in this
figure are instantaneous.