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Report of Referee A -- LT13360/Schaffner  
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The paper deals with a long-standing topic in plasma physics and  
fusion research, i.e., shear flows and turbulence modification, which  
is tightly related to the plasma confinement. The authors provide, in  
this paper, a very clear and quantitative relationship between shear  
flows and turbulence modification and the exact causes in the  
reduction of fluctuation-driven transport (e.g., amplitude reduction,  
change in crossphase) in a systematic manner, using a linear device  
where more precise measurement can be done with traditional probes, in  
contrast to fusion-oriented devices of high temperature. However, I  
find a serious problem with a paper. A bunch of works on this subject  
has shown, at least qualitatively, that the intense shear flows should  
result in the reduction of turbulence and turbulence-driven transport.  
My overall impression is that the paper is well-written in presenting  
their experimental results and their comparison with the BDT-theory,  
however, the new and significant points that the paper should add to  
the existing works are not so clearly demonstrated in the present form  
of the paper. Therefore, I suppose that the problem should be fixed in  
a revised version in order to have the paper worth published Phys.  
Rev. Lett.,

The new and significant points which come out of this research which separates this work from previously conducted experiments are as follows:

1. **Achievement of a range of flow values in both azimuthal directions**

The ability to drive flows into two azimuthal directions using limiters has been attempted before (see Silva PPCF 2003) but issues arise in that significant changes can only be made in one biasing direction (e.g. positive bias vs. negative bias). The spontaneous rotation observed in the LAPD is both significant to modify plasma parameters as well as being in the opposite direction that flow can be driven using the biasable limiters. Thus, observations on the effect of flow direction and shearing can be made in this configuration. Moreover, the results of this experiment suggest that there is little difference between flow in one direction versus the other in modification of plasma parameters such as particle flux and turbulence amplitude so that future attempts at biasing using both positive and negative values may be unnecessary.

1. **Achievement of a nearly-zero flow and flow shear state**

The plasma flow in LAPD can be nearly nulled out for a wide radial range (from center to ~3/5a, where a=50cm). This allows for a direct measurement of plasma parameters such a density profiles as well as rates such as the autocorrelation time and linear growth rates without the influence of flow (whether driven or spontaneous).

1. **Observation that turbulent amplitude reduction can be achieved for shearing rates less than the autocorrelation rate**

Theories suggest that strongly sheared flows (10-100 times autocorrelation rates) would be necessary to reduce turbulence and some experiments have show suppression with strong shear (at least 10x autocorrelation rate---see Weynants 1998, Boedo 2000) but this dataset suggests that turbulence can be reduced by as much as 50% for shearing less than the autocorrelation rate.

1. **Most detailed variation of biasing and shearing rate in a linear plasma device to date**

The ability to do a detailed analysis of biasing and shearing in a linear device like LAPD is useful as the issues associated with magnetic field curvature are not present. On LAPD, unlike on most fusion plasma devices where biasing done, one can conduct detailed probe measurements as well as (as will be shown in later papers) fast camera measurements.

The other important points are as follows.  
  
1) According to the recent understanding of the plasma turbulence and  
transport, zonal flows are one of the major players for the plasma  
turbulence. Therefore, if all stories contained in the paper are  
limited to the shearing flows, the paper seems behind time. If the  
authors can state anything about the behavior of zonal flows in their  
experiment, the paper is much stronger.

In a linear device such as LAPD, the mean azimuthal flows are more or less the same as zonal flows. Moreover, zonal flows are not the only player in the understanding of plasma turbulence. While the role of zonal flows on LAPD may not play as large a role in terms of understanding turbulence and transport, experiments such as that presented can explore other players such as the role of crossphase between density and electric field fluctuations, or shear/flow driven modes such as Kelvin-Helmholtz modes which are stable in devices with curved magnetic configurations

2) The authors do not show exactly the radial positions of the  
measurement on shearing rate, gradient, turbulence-driven fluxes, and  
so on. Are they the averaged values like the shearing rate in Fig. 1c,  
as the authors mention?

The paragraph at the bottom of page 4 indicates that all spatially averaged quantities are averaged over the range 27 to 31cm just as is indicated in Fig. 1b  
  
3) References seems insufficient, particularly in recent works of  
fusion research.  
  
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Report of Referee B -- LT13360/Schaffner  
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This paper reports a study of the suppression of turbulence and  
turbulent transport associated with sheared-flow in the edge of the  
LAPD device. The magnitude of the flow and flow-shear is adjustable  
continuously using a biased electrode arrangement. Measurements in the  
shadow of a biased limiter indicate that the flow-shear acts to reduce  
the amplitude of the turbulence, and therefore the turbulent particle  
flux. Few experiments have been conducted with this type of precise  
control of the flow. The paper is well written. I have only relatively  
minor comments for the authors to consider in a revision. These points  
are aimed to help improve the paper.  
  
1. There is a passing comment that drift waves are responsible for the  
turbulence. Earlier papers in the references state that the turbulence  
is drift-Alfven. It would be helpful for context for the authors to  
describe briefly the nature of the turbulence directly in this paper.  
If known, it would also be helpful to indicate the likely nature of  
the coherent mode that appears with the addition of the biasing.

The origin of the coherent mode that appears with strong flow/biasing is currently under investigation.  
  
2. While it is clear the turbulent particle flux is reduced, the  
context relative to overall particle balance in LAPD is not quite  
clear. Is the perpendicular loss dominant? One can imagine that  
parallel effects might be large in this plasma. It would be helpful to  
have a short discussion of the relative importance of the turbulent  
flux relative to overall particle balance.

The length of LAPD (approximately 20m) is sufficient to allow perpendicular transport of particles to compete with the parallel losses. A more detailed analysis of the particle balance is underway and will likely be presented in a future paper.  
  
3. I do not see in the paper a statement of the axial location of the  
radial profile measurements. Presumably it is between the limiter and  
end mesh, but the location should be noted. Is there any reason to  
expect the measurements would vary along the axial direction? In  
particular, is the shear flow axially uniform (between the  
electrodes)? One might imagine it is weaker away from the limiter.

The axial location can be noted.   
  
4. A minor point, are electron temperature fluctuations ignorable,  
such that floating potential measurements reliably yield the  
turbulence electric field? This might be important in regard to  
conclusions regarding the cross-phase, in particular.