JoVE Manuscript Changes: Responses to Comments by Reviewer 3.

**Manuscript title:** “Methods for Measuring the Orientation and Rotation Rate of 3D-Printed Particles in Turbulence”.

Formatting note:

* Reviewer comment.
  + Response.

**Edits made in response to comments from the reviewer:**

* Step 2.2 This step seems sensitive to the specific manufacturer. You did list this in Table 1, but it could help also to list the 3D manufacturing technique generically, e.g. “We used a proprietary polymer with bulk density of X that is built by laser-sintering of dry powder, with minimum resolution of 200 microns.”
  + Yes, step 2.2 is very dependent on the type of printer used. We added a sentence to 1.2 to help clarify. The editors have a set of requirements that prevent us from specifying the commercial printer we used in the text (only in the table) and also want us to be very specific about exactly how the experiments were performed. In this case, it is essentially impossible to meet both of these requirements.
* Line 180 Consider replacing the word “base” with “NaOH solution”
  + Done.
* Line 205 “extensive” may not be the best word choice here
  + Fixed. Changed “prevent extensive loss of dye” to “prevent losing a detrimental amount of dye”. It is hard to quantify what an acceptable amount of dye lost would be, as the ultimate test of the dye is the degree to which it fluoresces under the laser. This should be tested before experiments have begun.
* Line 259 Mention the word “aperture” in connection with the value f11 (or f/11).
  + This now reads “Set the apertures to f/11 and mount…”
* Line 259 Describe these filters generically, e.g. “532mm notch filters” or “neutral-density filter.” Also, B&W is a brand name, and you generally save those for table 1.
  + This has been changed to “532 nm notch filters to remove laser light while allowing through longer-wavelength fluorescence onto the cameras”.
* Line 260 check the grammar
  + Thank you for noticing the mistake. Changed “Be careful to change as little about the optical setup from this point forward” to “Be careful to change as little as possible about the optical setup from this point forward.”
* Step 3.1.5.7 I think this step requires more guidance. Either add a few sentences or add a citation to other work describing it in more detail.
  + Yes, there is a lot included in that step. We extended the description and included references to two sources that describe how this is done.
* Line 279 Specify the repetition rate at which the laser exhibits this average power. If the laser has a different average power at 450 Hz, please indicate that as well.
  + We added a note to the end of 3.2: “Note: The laser power is specified at a pulse frequency of 5 kHz. The pulse frequency in these experiments is 900 Hz, where the output power is significantly lower.”
  + The ambiguous language of step 4.4.2 has also been changed, from “Set cameras and laser to respond to an external trigger and set the frequency of the trigger to 450 Hz” to “Set cameras and laser to respond to an external trigger and set the frequency of the trigger to 450 Hz for the cameras and 900 Hz for the laser.”
* Steps 4.4.5 and 4.4.6 Consider saying explicitly that you check the set of 10^6 images for quality before proceeding to step 4.4.7
  + Done.
* Line 365 because the geometric regularity is invoked here, I think that the claim of "arbitrary shape" as indicated on line 86 is either overstated, or needs more discussion.
  + More careful language has been used in line 86: “arbitrary shape” has been changed to “a wide variety of shapes”.
  + For particles that were not as symmetric as those in these experiments, methods similar to these could still be used for finding their positions and orientations. More care would just have to be taken when finding the center of the particle, since, as is implied in this comment, the optical center of bright pixels would not necessarily be the center of the particle.
* Line 409-410 I think it would be cool to see a model image corresponding to the fit in image 3b.
  + This is something that will be included in the video.
* Euler angles - because the term "Euler angles" is often used loosely or incorrectly, it is helpful to be very explicit about what orientation convention you use. For example, you can say "phi, theta, and psi represent subsequent rotations about X,Y, then Z axes, which are fixed in the lab frame" or "phi, theta, and psi represent subsequent rotations about the particle's X,Y, and then new X axis"
  + A note has been included after 5.1.5.1 that clarifies the Euler angle convention used in these experiments and analyses.
* Line 440 I would like to see the “more recent work” cited, or expanded upon here.
  + This work not yet been published. We have slightly extended this description, but full specification of how to do the least squares fit seems beyond the discussion here.
* Line 504 I don’t understand what you mean by “A higher volume of measurements”
  + The phrasing was confusing. Changed “A higher volume of measurements” to “Having more measurements”.