

Supplemental material for “Challenges in using GPUs for the reconstruction of hologram images”

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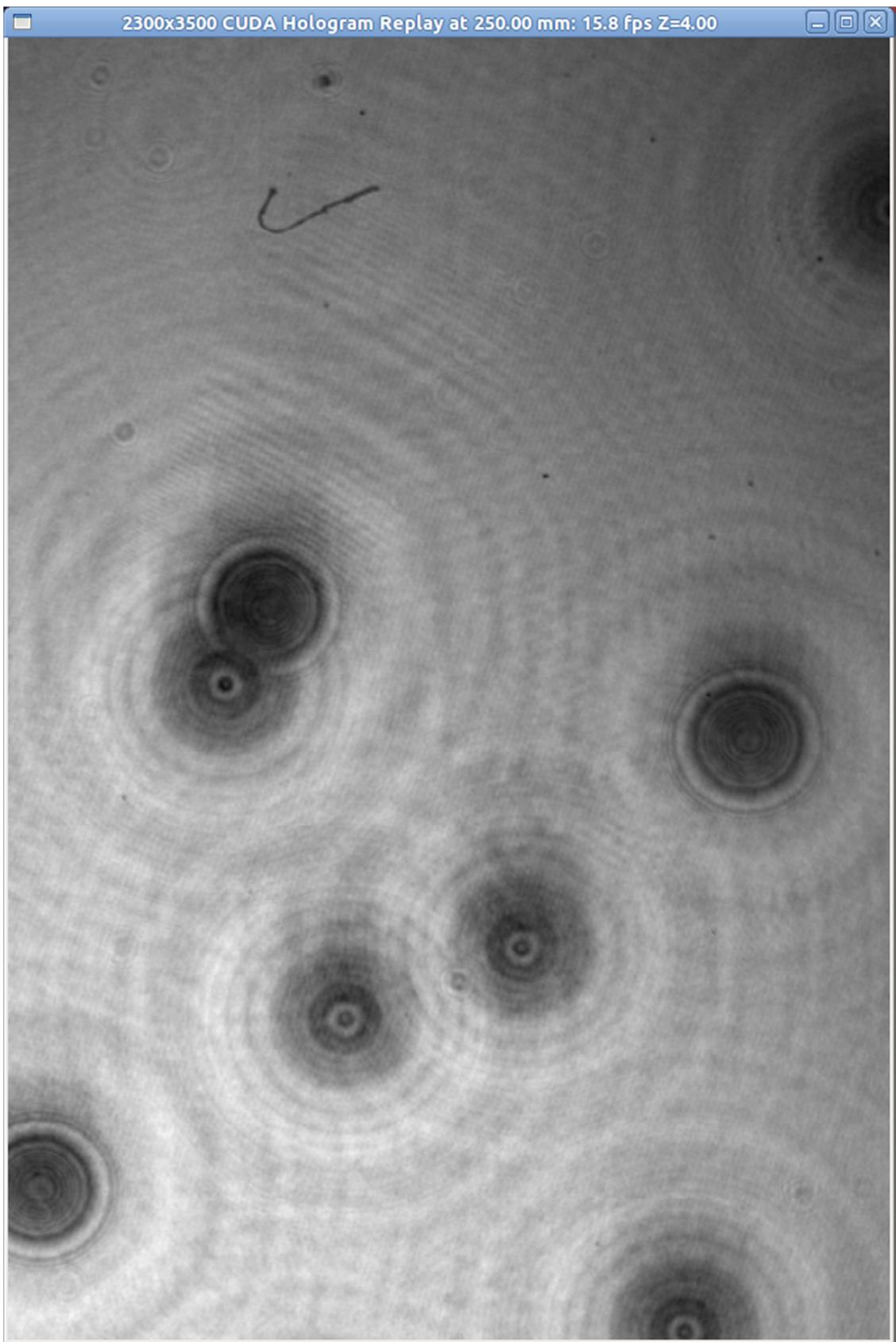
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The enclosed supplementary material provides screenshots from the software described in the accompanying paper. They show reconstructed images obtained by GPU calculations from a single digital in-line hologram, at varying reconstruction depths, using an Nvidia C2070 GPU (448 thread processors, 5375 MiB ECC memory). The image was recorded using an 8-megapixel camera (Atmel Camelia 8M, with 2300x3500 10 μm -square pixels and a 12-bit digitisation depth) and a collimated 1 mW beam from a c.w. HeNe laser at $\lambda=633$ nm. The target was a water tank with 8 mm thick glass windows ~86 mm apart, placed 258 mm away from the detector. After filling with water the tank was allowed to stand until small air-bubbles formed on the insides of the windows.

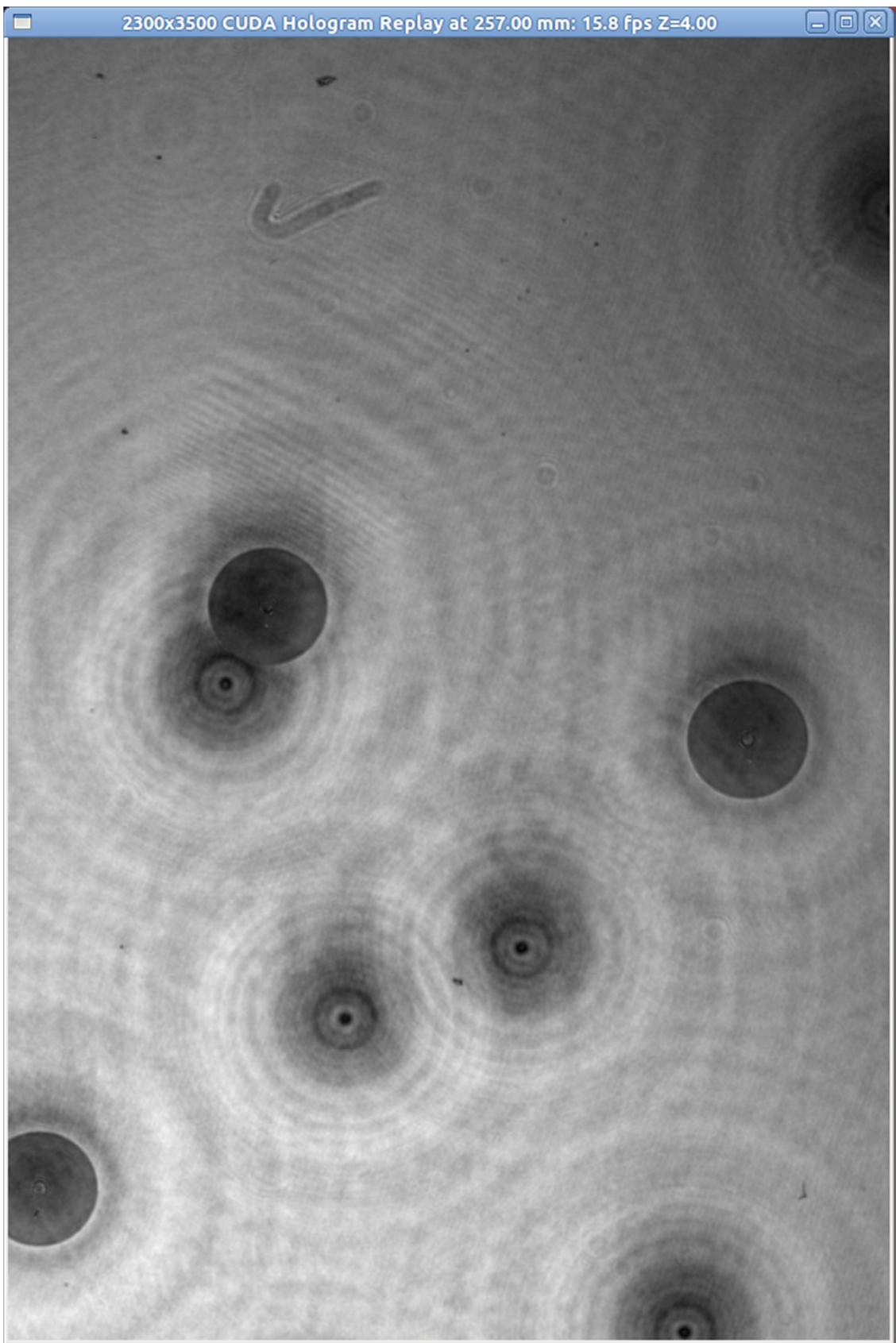
The replayed images have been zoomed in by a factor of four while the reconstruction looped continuously at full speed (15.8 frames/second) and the reconstruction was scanned to “interesting” image depths before the snapshots were taken. Note that the reconstructed depths have been calculated assuming a refractive index of unity, so they will not correspond exactly to the dimensions above due to the denser media in the laser path. The images show:

- a) the outside of the front window, with dust particles;
- b) the inside of the front window, with attached air-bubbles and small specks of contamination;
- c) the inside of the rear window, with attached air-bubbles and a dust fibre; and
- d) the outside of the rear window with dust flecks and what appears to be a scratch in the glass.

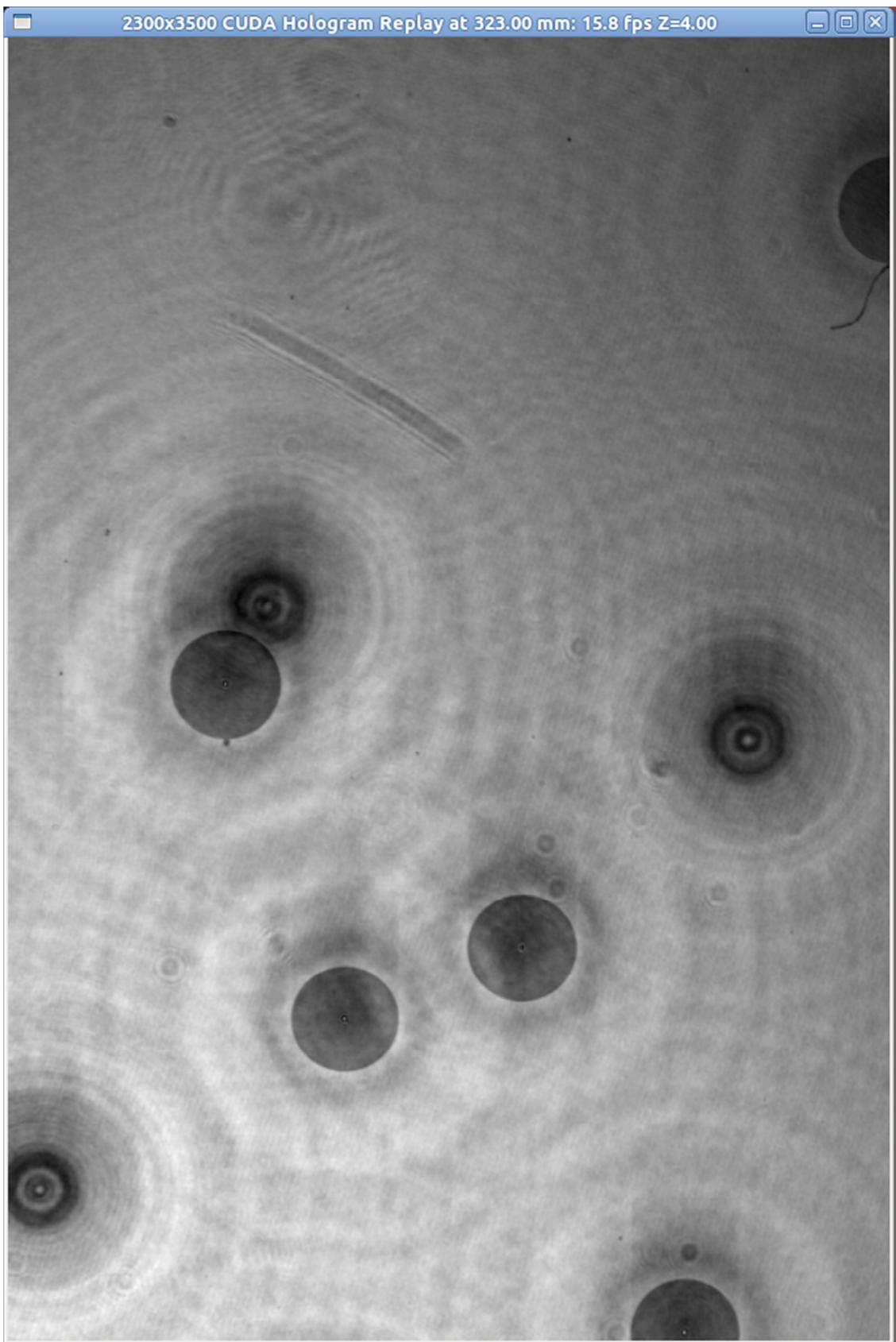
The same region of the hologram can be viewed as a video, recreated on a much slower Nvidia GT 8500 video-card (16 thread processors, 512 MiB memory) with pixels summed to give an 1150x1750 image, at <http://www.youtube.com/watch?v=WiE82RjqMzI>



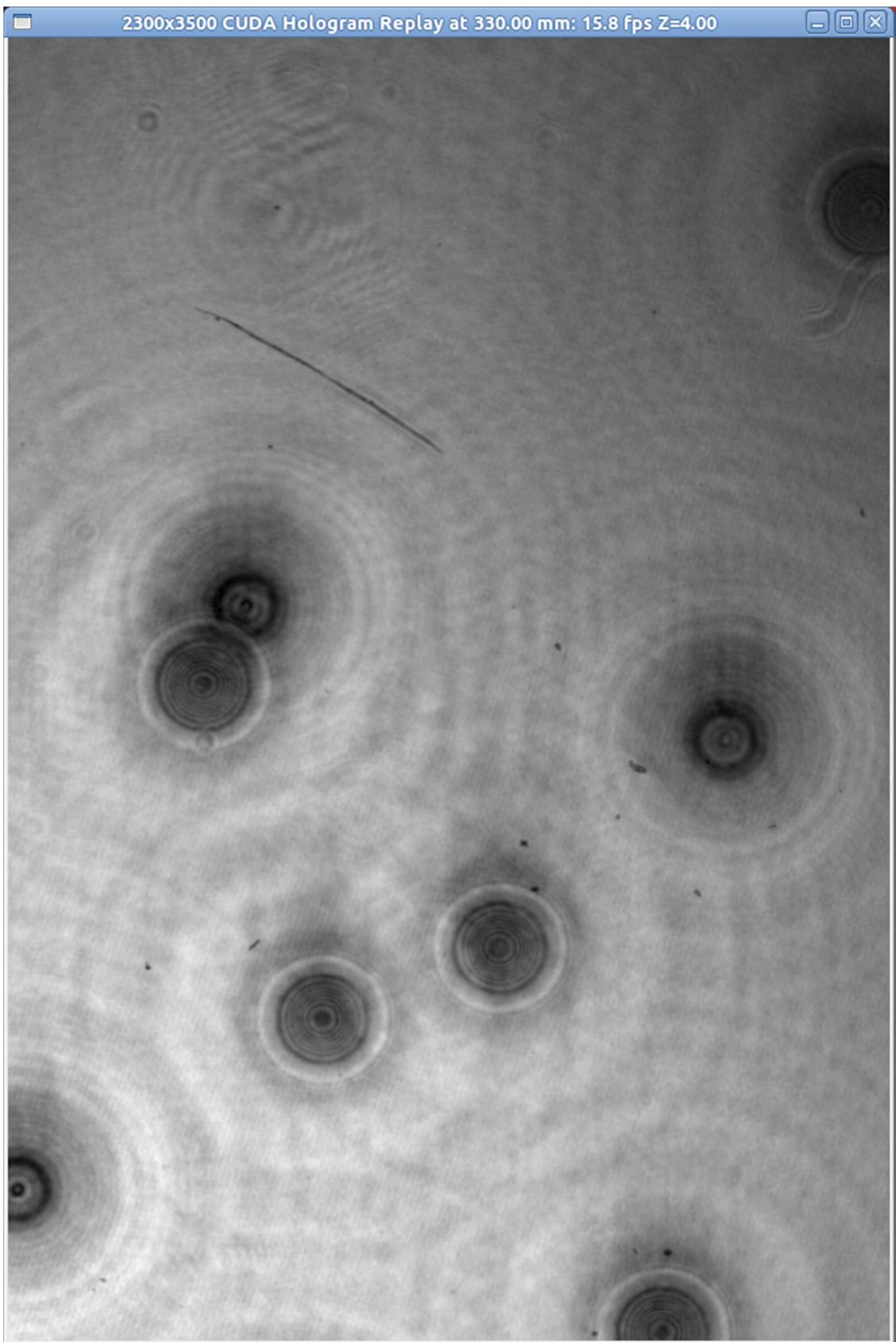
a) Outside of front window



b) Inside of front window



c) Inside of rear window



d) Outside of rear window