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Shapes of Swiftly Spinning Superfluid He Nanodroplets CHARLES BERNANDO, RICO TANYAG, CURTIS JONES, LUIS GOMEZ, ANDREY VILESOV, University of Southern California, CAMILA BACELLAR, JAMES CRYAN, KATRIN SIEFERMANN, FELIX STURM, OLIVER GESSNER, Lawrence Berkeley National Laboratory, DENIS ANIELSKI, LARS ENGLERT, LUTZ FOUCAR, DANIEL ROLLES, ARTEM RUDENKO, JOACHIM ULLRICH, Max Planck Advanced Study Group, ROBERT HARTMANN, MARTIN HUTH, PNSensor GmbH, KEN FERGUSON, SEBASTIAN SCHORB, CHRISTOPH BOSTEDT, SLAC National Accelerator Laboratory — The results of recent measurements of the shapes of large rotating superfluid He nanodroplets of about 500 nm in diameter are presented. The droplets are produced upon expansion of high purity He gas into vacuum through a nozzle at a temperature of 5 K. The droplets were irradiated by the Linac Coherent Light Source X-ray free electron laser to obtain coherent diffraction images of the droplets. Some diffraction images indicate the presence of non-spherical droplets with a large aspect ratio of up to about 2 that possess wheel shapes. A few images also show the existence of droplets with a depression in the middle. These images are attributed to the oblate axisymmetric shapes adopted by fast rotating droplets. The contours of individual droplets are reconstructed using an inverse Fourier Transform and compared with the results of theoretical calculations for classical droplets. The angular velocity in the droplets is estimated. The range of stability of the droplets is analyzed. The experiments and the full list of authors are reported in Science 345, 906 (2014).

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