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Pressure study of nematicity and quantum criticality in $Sr_3Ru_2O_7$ for a in-plane field DAN SUN, WENLONG WU, Department of Physics, University of Toronto, SANTIAGO A. GRIGERA, Scottish Universities Physics Alliance, School of Physics and Astronomy, University of St. Andrews, ROBIN S. PERRY, Center for Science at Extreme Conditions, School of Physics, University of Edinburgh, ANDY P. MACKENZIE, Scottish Universities Physics Alliance, School of Physics and Astronomy, University of St. Andrews; Canadian Institute for Advanced Research, STEPHEN R. JULIAN, Department of Physics, University of Toronto; Canadian Institute for Advanced Research — We study the relationship between the nematic phase of $Sr_3Ru_2O_7$ and quantum criticality. At ambient pressure, the nematic phase appears to be associated with a metamagnetic quantum critical end point (QCEP) when the applied magnetic field is near the c-axis. We show, however, that this metamagnetic transition does not produce the same nematic signatures when the QCEP is reached by hydrostatic pressure with the field applied in the ab-plane. Moreover, a distinct nematic phase, that is seen for field applied in the ab-plane close to, but not right at, a metamagnetic anomaly, persists with minimal change to the highest applied pressure, 16.55 kbar. Taken together our results suggest that quantum criticality may not be necessary for the formation of a nematic phase.

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