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**New Transition in the Vortex Liquid State: intrinsic limit of the irreversibility line** WAI-KWONG KWOK, GORAN KARAPETROV, ULRICH WELP, ANDREAS RYDH, GEORGE CRABTREE, Argonne National Laboratory, LISA PAULIUS, Western Michigan University, JORDI FIGUERAS, TERESA PUIG, XAVIER OBRADORS, Institut de Ciencia de Materials de Barcelona — We have carried out angular dependent magneto-transport measurements on optimally doped, untwinned YBCO crystals irradiated with high energy heavy ions to determine the onset of vortex line tension in the vortex liquid state. The matching field was controlled and kept at a low level to partially preserve the first order vortex lattice melting transition. A Bose glass transition is observed below the lower critical point which then transforms into a first order phase transition near 5 Tesla. The locus of points which indicate the onset of vortex line tension overlaps with the Bose glass transition line at low fields and then deviates at higher fields, indicating a new transition line in the vortex liquid state. This new line in the vortex liquid phase extends beyond the upper critical point. This work was supported by the U.S. Department of Energy, BES, Materials Science under Contract No. W-31-109-ENG-38 at Argonne National Laboratory.

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