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The velocity field of laboratory fire whirls KATHERINE HARTL, STACY GUO, ALEXANDER SMITS, Princeton University — Fire whirls increase the intensity of wild fires, and they enhance the spreading rate of fire by ejecting flaming debris, often rendering prepared fire fighting plans useless. Fire whirls are produced by buoyancy, ambient vorticity, and the titling of regions of intense horizontal negative shear at the fire front. They can shed from a smoke plume, form in the turbulent wake of a hill, or arise due to concentrated heat sources. To understand and model fire whirls in greater detail, an experimental study is conducted to generate a fire whirl in the laboratory, and examine the velocity fields outside and inside the vortex core. We use flow visualization and PIV to obtain qualitative and quantitative data, and discuss the scaling behavior.

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