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Probing modal dynamics of Rayleigh-Bénard convection using optical actuation ADAM PERKINS, MICHAEL SCHATZ, Georgia Tech — We report on a new experimental approach to investigate the dominant modes governing instability in Rayleigh-Bénard convection. The convective fluid is a gas that strongly absorbs incident infrared laser light. Laser light absorption results in localized heating, thereby altering the fluid flow. Rapid scanning of the light by servo mirrors allows actuation at multiple spatial points nearly simultaneously. This approach provides a tool for repeatedly imposing a given convection pattern, e.g., straight rolls. Selected perturbations are applied to this initial pattern, thus providing an ensemble of systems with nearby initial conditions. Modal dynamics are extracted from the subsequent pattern evolutions, monitored via time series of shadowgraph images.

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