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Controlling and Understanding Laser Filamentation in the Solution and Gas Phase Molecular Systems

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The process of laser filamentation is highly nonlinear, yet amenable to control using laser pulse shaping techniques. Investigations of our ability to control the spatial position of a filament in a water tank and measurements of the forward and back scattered amplified spontaneous emission (resulting from the strong field excitation in the resulting plasma) will be presented. Our time resolved measurements of the dynamics of the filamentation process in various gases will also be reviewed. Finally, a model of the plasma formation will be presented.