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Enhancing the feedback signals used in closed-loop control of molecular fragmentation[1] MICHAEL A. TODT, NICK SMOLNISKY, NATHAN JASTRAM, BETHANY JOCHIM, N.G. WELLS, E. WELLS, Department of Physics, Augustana College, Sioux Falls, SD 57197 USA, J. MCKENNA, A.M. SAYLER, B. GAIRE, NORA G. JOHNSON, M. ZOHRABI, K.D. CARNES, I. BEN-ITZHAK, J.R. Macdonald Laboratory, Department of Physics, Kansas State University, Manhattan, KS 66506 USA — Using CO as a prototype system, the role of the feedback signal is examined in a closed-loop coherent control technique utilizing ultrafast laser pulse shaping coupled to a genetic algorithm. We control the fragmentation branching ratio of CO^+ or CO^{2+} with a feedback signal obtained from a time-of-flight spectrometer. Optimization of the ratio of $(C^+ + O)/(C + O^+)$ using a signal that integrated all of the C^+ fragments produced a different optimal pulse than when the kinetic energy release was used to separate the $C^+ + O$ and $C^+ + O^+$ channels. Feedback signals obtained using particle counting detection rather than current mode were used to optimize low-probability channels, such as CO^{2+}, suggesting the possibility of incorporating coincidence measurements into feedback loops.

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Eric Wells
Department of Physics, Augustana College, Sioux Falls, SD 57197 USA

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