

## Quantum control through measurement feedback

Uys, Hermann  
Bassa H  
Du Toit P  
Ghosh S  
Konrad T

### ABSTRACT:

Measurement combined with feedback that aims to restore a presumed premeasurement quantum state will yield this state after a few measurement-feedback cycles even if the actual state of the system initially had no resemblance to the presumed state. Here we introduce this mechanism of self-fulfilling prophecy and show that it can be used to prepare finite-dimensional quantum systems in target states or force them into target dynamics. Using two-level systems as an example, we demonstrate that self-fulfilling prophecy protects the system against noise and tolerates imprecision of feedback up to the level of the measurement strength. By means of unsharp measurements the system can be driven deterministically into arbitrary, smooth quantum trajectories.