

Abstract Submitted  
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**Decoherence Functionals for Quantum Cosmology** DAVID CRAIG,  
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Physics — Decoherence functionals are explicitly constructed for flat cosmological  
models in both standard Wheeler-DeWitt theory and also loop quantum cosmology,  
thereby permitting consistent quantum predictions to be made in complete, math-  
ematically precise models of quantum cosmology. Consistent families of quantum  
histories are exhibited and the prediction of semiclassical behavior for suitable initial  
states described. Criteria for the resolution of the initial singularity are formulated  
in a precise way. Singularity avoidance in loop-quantized models is contrasted with  
the failure of Wheeler-DeWitt quantum cosmological models to avoid the big-bang  
singularity. The critical role played by decoherence of histories is illustrated in  
this example by showing that failure to consider decoherence leads to precisely the  
*opposite* conclusion for a large class of states.

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