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**Natural vacuum state for quantum fields in an initially radiation dominated universe and its relationship to the Bunch-Davies state**[1] BRADLEY B. HICKS, PAUL R. ANDERSON, Wake Forest University — It is shown that if the universe is initially radiation dominated, then for a scalar field with arbitrary mass and curvature coupling there is a natural vacuum state. The evolution of scalar fields in this vacuum state is investigated for a simple model where the presence of a cosmological constant causes the universe to expand exponentially at late times and thus to be asymptotically de Sitter. The question of whether the vacuum state approaches the Bunch-Davies state at late times is addressed.

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