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**Gotay, Mark J.** (1-USNA)

**Negative energy states in quantum gravity?**

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Summary: “The phenomenon of ‘quantum tunnelling through classical constraints’ is analysed. We show by example that such tunnelling may lead to physical inconsistencies: systems for which the extended phase space quantisation does not have a well-defined classical limit and is wildly incompatible with the reduced phase space quantisation. These pathologies are shown to originate in an inappropriate choice of polarisation, and a quantisation ansatz is proposed which eliminates them. Such results indicate that initial value constraints should form absolute barriers quantum mechanically as well as classically, and consequently that tunnelling does not provide a physically viable means of transcending the positive energy theorems in quantum gravity.”

*Virgil Obădeanu* (Timișoara)