1096-65-2130 **James Brian Hall*** (j9hall@math.ucsd.edu), Department of Mathematics, University of California, San Diego (UCSD), 9500 Gilman Drive #0112, La Jolla, CA 92093-0112. *Long Term High-Order Numerical Integration with Galerkin Variational Integrators.*

Many standard methods of numerical integration are unsuitable for integration over long time periods. Symplectic integrators have been successful where standard methods have failed, and are often used for long term simulations. However, symplectic integrators are typically low order, and investigation of constructions of high order symplectic integrators is an area of active research. In this talk, I will present a method of constructing symplectic integrators of arbitrarily high order, and then demonstrate how these integrators can be efficiently implemented to facilitate very long term simulations. I will close with a numerical demonstration, a 100 million year integration of the Solar System using a very high order symplectic method. (Received September 17, 2013)