**Title:**
Quinpi, or going implicit for nonlinear hyperbolic equations

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**Abstract:**

Many interesting applications of hyperbolic systems of equations are stiff, in the sense that restrictive CFL conditions are imposed by fields that one is not really interested in tracking accurately. A typical solution in these cases is to resort to implicit time integration, but in the field of high order accurate numerical schemes for hyperbolic equations this is made very difficult by the extreme nonlinearity of the reconstruction operators.

In this talk I will illustrate an approach, that we called Quinpi, to treat nonlinear hyperbolic equations with high order accurate implicit timestepping. It is based on a third order Central WENO reconstruction, a third order DIRK time integrator and a novel idea of time limiting. The scheme is linearized as much as possible using first order accurate predictors for Runge-Kutta stages and the final scheme contains only the nonlinearity of the flux function: in particular it can be applied by solving only linear systems for linear equations. The limiting in time is needed to control spurious oscillations arising from the fact that waves can cross more than one computational cell in each timestep.

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