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**Carlos E. Arreche\*** ([cearrech@math.ncsu.edu](mailto:cearrech@math.ncsu.edu)), Mathematics Department, North Carolina State University, Raleigh, NC 27695. *Projectively integrable linear difference equations and their Galois groups.*

A linear difference equation is integrable if its solutions also satisfy a linear differential system of the same size. The difference equation is projectively integrable if it becomes integrable "after moding out by scalars". Based on recent results of R. Schäfke and M. Singer, we show that when the system has coefficients in  $\mathbb{C}(x)$  and  $\sigma$  is either a shift,  $q$ -dilation, or Mahler operator, the difference-differential Galois group  $G$  attached to an integrable or projectively integrable difference equation has a very special form. As an application of these results, one can prove that certain combinatorially-defined generating functions do not satisfy any polynomial differential equations. This is joint work with Michael Singer. (Received September 20, 2016)