Discrete Geometry of Polygons and Soliton Equations

The relation between the discrete geometry of surfaces and completely integrable systems has been well established in the last few decades, through work of Bobenko, Suris and many others. The recent introduction of discrete moving frames by Mansfield, Mari-Beffa and Wang, and the study of the pentagram map by Richard Schwartz and many others, has produced a flurry of work connecting the discrete geometry of polygons to some completely integrable systems in any dimension, including connections to Combinatorics and the study of the role that the background geometry has in the generation of algebraic structures that often describe integrability. In this talk I will review definitions and background, and will describe recent advances in the proof of the integrability of discretizations of Adler-Gelfand-Dikii systems (generalized KdV), aided by the use of the geometry of polygons in $\mathbb{R}P^n$. 

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