Sergei Tabachnikov (Pennsylvania State University)

Title: *Tire tracks geometry, continuous and discrete bicycle transformation, and the filament equation.*

Abstract: This talk concerns a simple model of bicycle motion: a bicycle is a segment of fixed length that can move so that the velocity of the rear end is always aligned with the segment. The rear wheel track and a choice of direction determine the front wheel track; changing the direction to the opposite, yields another front track. The two front tracks are related by the bicycle, or Backlund-Darboux, transformation which defines a discrete time dynamical system on the space of curves. This system is completely integrable and closely related with a well studied completely integrable continuous time dynamical system, the filament (or binormal, or smoke ring) equation. I shall also discuss a discrete version of the Backlund-Darboux transformation acting on polygons, rather than smooth curves.