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On common roots of Legendre polynomials

Let S be a closed Riemannian surface, and $\gamma \subset S$ be a curve. An old question in Spectral Geometry asks how many Laplace eigenfunctions can vanish on γ . Bourgain and Rudnick showed that on the flat torus $\mathbb{T}^2$ this number is finite unless γ is a closed geodesic. A conjecture by Stieltjes says that no two zonal spherical harmonics may vanish on the same small circle, or in arithmetic terms, no two Legendre polynomials share a non-zero common root. We show that the number of Legendre polynomials which share any given non-zero root is finite. The talk is based on joint work in progress with Borys Kadets.