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Bijective proof of rational enumerative schemes for maps on the torus of genus g.

Maps are graphs embedded into surfaces. Their study started in the 60s with Tutte's work, in which he obtained many closed enumerative formulas for the planar case (i.e. when the surface is the sphere). These formulas, obtained by highly non trivial computations, are remarkably simple. To explain this simplicity, some bijections between planar maps and certain families of decorated trees were obtained (among others!) by Cori and Vauquelin in 1981 and by Schaeffer in 1997 and 1998

When the underlying surface is the torus with g holes, in 1991 Bender and Canfield obtained, followed by Bender, Canfield and Richmond in 1993, obtained some formulas analogous to Tutte's ones, but in the form of a rationality scheme valid for any g.

In this talk, I will give the first bijective derivation of their result, which consists in an extension of Schaeffer's bijection to the torus.

This is based on a joint work with Mathias Lepoutre.