

« PREMIÈRE RENCONTRE MATHÉMATIQUE BAVIÈRE–QUÉBEC »
30 NOVEMBRE–3 DÉCEMBRE, 2009

“FIRST BAVARIA–QUÉBEC MATHEMATICAL MEETING”
NOVEMBER 30–DECEMBER 3, 2009

Corners on the sphere and sharp extensions of
the theorems of Landau and Schottky

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An explicit formula for the generalized hyperbolic metric on the thrice-punctured sphere $\mathbb{P}^1 \setminus \{z_1, z_2, z_3\}$ with singularities of order $\alpha_j \leq 1$ at z_j is obtained in all possible cases $\alpha_1 + \alpha_2 + \alpha_3 > 2$. The existence and uniqueness of such a metric was proved long time ago by Picard and Heins, while explicit formulas for the cases $\alpha_1 = \alpha_2 = 1$ were given earlier by Agard (1968) and recently by Anderson, Sugawa, Vamanamurthy and Vuorinen. We also establish precise and explicit lower bounds for the generalized hyperbolic metric. This extends work of Hempel and Minda. As applications, sharp versions of Landau- and Schottky-type theorems for meromorphic functions are obtained.

This is joint work with Daniela Kraus and Toshiyuki Sugawa.