rew
12/7/25
The Editor team JMP,

Subject: Submission of Manuscript: "A One to One Isomorphism between the ζ Function and the Yang-Baxter Equations"

Dear Editor-in-Chief,

I am pleased to submit our manuscript, "A One to One Isomorphism between the ζ Function and the Yang-Baxter Equations," by Drew Remmenga, for consideration for publication in JMP Journal.

This work presents a novel, formal algebraic correspondence between two central objects in mathematical physics: the Riemann zeta function (through a specific integral representation) and the Yang-Baxter equation (YBE), a cornerstone of integrable systems. We construct this link by developing a calculus based on a regularized Weierstrass product for cosh(x/2). Using Bell polynomials to encode derivatives, we define formal integral transforms σ(s,n,m) and τ(s,n,m) and derive a closed system of recurrence relations via integration by parts.

The core result is that these recurrences—exhibiting symmetry, parity constraints, and quasi-periodicity—are precisely the algebraic structure needed to define a Temperley-Lieb type R-matrix and prove it satisfies the Yang-Baxter equation. Crucially, this isomorphism is established in a purely formal, algebraic manner, independent of analytic convergence, highlighting the underlying structural kinship between the calculus of infinite products and the algebra of integrable vertex models.

We believe this manuscript is an excellent fit for JMP Journal as it directly engages with the journal's core themes:

Symmetry: The recurrence relations and the derived R-matrix exhibit explicit symmetry properties.

Integrability: The work is fundamentally about constructing and solving the Yang-Baxter equation, the master relation of quantum integrability.

Geometry: The formal calculus originates from the zero-set geometry of cosh(x/2), and the R-matrix acts on a vector space V=C2.

Methods and Applications: It introduces a novel formal method connecting special functions (zeta) to integrable models, potentially opening new avenues for algebraic analysis in both fields.

This work is original, has not been published previously, and is not under consideration elsewhere. All results are presented with rigorous formal proofs.

We suggest experts as potential referees, familiar with the interplay of special functions, Bell polynomials, and integrable systems.

Thank you for your time and consideration. We look forward to your response.

Sincerely,

Drew Remmenga
unaffiliated