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Titolo	Some Musings on Theta, Eta, and Zeta : From E8 to Cold Plasma to an Inhomogeneous Universe // by Floyd L. Williams
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Descrizione fisica	1 online resource (233 pages)
Collana	Mathematical Physics Studies, , 2352-3905
Disciplina	530.15
Soggetti	Mathematical physics Number theory General relativity (Physics) Mathematical Physics Number Theory General Relativity Relativitat general (Física) Teoria de nombres Física matemàtica Llibres electrònics
Lingua di pubblicazione	Inglese
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Livello bibliografico	Monografia
Nota di contenuto	A Theta Function Attached to a Positive Definite Matrix -- Jacobi Type Inversion Formulas -- A Theorem of Minkowski: Enter E8 -- Modular Properties of Theta and Eta -- An Epstein Zeta Function Attached to A -- An Inhomogeneous Epstein Zeta Function -- Dirichlet and Hecke L-functions, Sums of Squares, and Some Other Stuff -- The Modular j-Invariant and Powers of Its Cube Root: Enter E8 Again -- Modular Forms of Non-Positive Weight: Exact Formulas and Asymptotics of Their Fourier Coefficients -- More on Logarithmic Corrections to Black Hole Entropy -- A Dedekind Type Eta Function Attached to the Hecke Group $O(N)$ -- Elementary Particles, the E8 Root Lattice, and a Patterson-Selberg Zeta Function -- The Uncontroversial Mathematics Behind Garrett Lisi's Controversial "Theory of Everything" -- The Elliptic Functions $sn(x, k)$, $cn(x, k)$, and $dn(x, k)$ of C.Jacobi -- The Continuous

Heisenberg Model, Reaction Diffusion System, Cold Plasma, and the J-T Black Hole -- The Weierstrass P-Function and Some KdV Solutions -- The Weierstrass Sigma and Zeta Functions: Theta Function Connections -- A Finite Temperature Zeta Function -- Lemaitre, Inhomogeneous Cosmology, and a Quick Look at the BTZ Black Hole -- A Cold Plasma-sine-Gordon Connection -- A Theta and Zeta Function Attached to a Non- Compact Symmetric Space: Computation of the One-Loop Effective Potential.

Sommario/riassunto

This book continues the applications of mathematics, more specifically of theta, eta, and zeta functions, and modular forms, to various areas of theoretical physics. It is a follow-up and extension in some sense of the author's earlier book entitled *A window into zeta and modular physics*. Some of the main topics are

1. A new approach to logarithmic corrections to black hole entropy
2. My recent work that provides for an explicit cold plasma-black hole connection
3. Generalization of work of physicists on certain asymptotic problems relating to string theory, for example, by way of the general theory of modular forms of non-positive weight
4. A construction of the E_8 root lattice, its theta function, and its relevance for heterotic string theory
5. Applications of elliptic functions to KdV, nonlinear Schrödinger, and Duffing equations, for example, including a discussion of Lax pairs and the Miura transformation
6. Finite temperature zeta functions and partition functions for quantum fields in thermal equilibrium on various curved background spacetimes
7. Exact solutions of the Einstein gravitational field equations for Lemaitre and inhomogeneous cosmological models, with a special focus on the Szekeres–Szafron exact solutions by way of the Weierstrass elliptic function
8. Elementary particles and my zeta function formula for higher spin fermionic particles; this covers, in particular, the gravitino particle (of spin $3/2$) and bosons with integral spin $s = 2, 3, 4, 5$. These are some sample topics. Others include the continuous Heisenberg model, reaction diffusion systems, Dirichlet and Hecke L-functions, the modular j -invariant, the computation of the one-loop effective potential for non-compact symmetric spaces, the BTZ black hole, Jacobi inversion formulas, etc. Thus, there is a very large range of material with the first 9 chapters of preliminary, expository background for mathematicians and physicists.
