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The Hottest Liquid on the Planet

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We generally expect high temperature matter to act like a gas. However, nature sometimes holds surprises. Collisions of heavy nuclei at very high energies produce a plasma of quarks and gluons which is a strongly coupled liquid. Its vanishingly small shear viscosity to entropy density ratio means it flows essentially without resistance, making it one of the most “perfect” liquids known. Astoundingly, a key tool for theoretical study of the dynamics of this novel liquid arises from the duality of string theory with black holes. I will describe how this liquid is studied, what we’ve learned about its properties at the Relativistic Heavy Ion Collider in the U.S. and at the Large Hadron Collider in Switzerland, as well as what we haven’t figured out yet. I’ll also discuss how the quark gluon plasma relates to other strongly coupled systems such as dusty plasmas, cold atomic gases, and strongly correlated condensed matter.