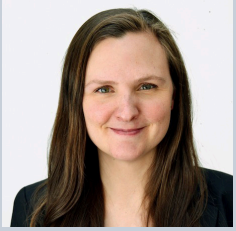
Recreating conditions of the early Universe



Laura Havener
Assistant Professor

Laura Havener focuses on experimental high energy nuclear physics, studying quantum chromodynamics (QCD) using high-energy particle colliders. She specializes in exploring the complex structure of high-energy particles known to investigate the intricate nature of the deconfined state of QCD matter called the quark-gluon plasma (QGP).

Havener, along with other members of Yale's Relativistic Heavy Ion Group (RHIG), develops curriculum, activities, and experiments for local high school students with the Yale Pathways to Science program.

Relativistic Heavy Ion Group (RHIG)

RHIG, co-led by Helen Caines, Laura Havener, and John Harris, uses experiments that accelerate and then collide particles to recreate a primordial state of matter, the quark-gluon plasma (QGP). The QGP is a hot, dense, soup-like state of the fundamental particles of nature—predicted by the Standard Model of particle physics to have existed ten millionths of a second after the Big Bang—and is one of nature's most extreme fluids. The group's research focuses on measuring jets—the spray of high momentum particles from high energy particle collisions—and jet substructure to further understanding of the the properties and evolution of the QGP. RHIG is involved in the ALICE, STAR and ePIC collaborations.

A Large Ion Collider Experiment (ALICE)

ALICE is a detector at the Large Hadron Collider (LHC) at the European Organization for Nuclear Research (CERN) in Switzerland. The ALICE detector has recently undergone upgrades that will allow for the production of two orders of magnitude more data. RHIG members have contributed to various aspects of the preparations and data-taking, and this expanded data set will be a primary focus of the RHIG ALICE program in the next few years. Havener is a co-convener for the Jets and Hard Photons Physics Working Group.

Electron-Ion Collider (EIC)/Electron-Proton Ion Collider (ePIC)

RHIG has substantially increased its involvement in preparations for the future EIC, which will be built at Brookhaven National Laboratory (BNL) in Long Island, New York. The group has multiple ongoing research and development projects for the EIC, including particle identification (PID) detectors. Testing and characterizing photosensors for the proximity-focused ring-imaging Cherenkov (pfRICH) detector will be done at Wright Lab. Members of the group are also involved in software development for PID reconstruction.