

## RBRC: A great success

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This year, 2017, marks the twentieth anniversary of the establishment of the RIKEN BNL Research Center (RBRC). Its great success is attributable to the amiable, constructive cooperation of many enlightened individuals involved in its establishment and subsequent sustainability. Equally relevant and important have been the management structures, review procedures established by RIKEN, BNL and RBRC. These involved the Management Steering Committee, Scientific Review Committee and Theory, Lattice and Experimental Advisory Committees. These were augmented by the Nishina Center and RIKEN reviews established for the consideration of the formal renewal of the RBRC, usually every five years, the fourth such successful review having taken place this year 2017. This has produced of the order of 100 outstanding fellow and post-doc graduates that now occupy leading positions at major national and international institutions.

The mission of RBRC is dedicated to the study of the strong interactions, including spin-physics, lattice QCD and RHIC (Relativistic Heavy Ion Collider). This is facilitated through the establishment of both the theoretical and experimental component, consisting of fellow and post-doctoral positions. Activities have centered around: 1) RHIC which is finishing its seventeenth year of operation having accelerated ions ranging from protons and deuterons to gold and uranium, equal and unequal species, energies from five GeV/A to 100 GeV/A

and both transverse and longitudinal proton polarizations. This machine has recently attained forty times its design luminosity. 2) The Phenix Detector for which RIKEN supplied the second muon arm and has had an extraordinary enriched publication record in both QCD and Spin. 3) A series of lattice gauge computers QCDSF (1 TFLOPS), QCDOC (10 TFLOPS), QCDCQ (700 TFLOPS), the latter being a prototype for the IBM Blue Gene. These were developed by a large collaboration including Columbia U, Edinborough, RBRC and IBM and for which RIKEN made the major monetary contributions.

What has emerged has been a profusion greater than 1000 in refereed journals and conferences, a plethora of work shops greater than 100 and numerous awards for computer performance. Among the most notable findings have been 1) the discovery of the strongly interacting quark gluon plasma (sQGP) or a perfect liquid a new form of matter whose nature is being explored and deciphered, 2) dynamics of gluon saturation and the color glass condensate, 3) chiral symmetry and its implications and restoration, 4) the gluon contribution to the spin of the proton where it now appears to be larger than that of the quarks, 5) lattice calculation of the CP violation in Kaon decays. RBRC has been a major contributor to all these methods.

It has been an outstanding twenty years and one is looking forward to an equally productive future.



Fig. 1. A photo taken at the signing of the memorandum of understanding in 1997 for the establishment of RBRC with (front, seated from left) Satoshi Ozaki, Head of BNL Relativistic Heavy Ion Collider Project; the author, BNL Director; T.D. Lee, RBRC Director; (back, standing from left) Henry Grahn, Associate Director for Administration; Peter Bond, Chair of BNL Physics Department; Thomas Kirk, BNL Associate Director for High-Energy & Nuclear Physics.

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