

CURRICULUM VITAE

- **1. Name:**

Chung-I TAN

Professor of Physics

Physics Department, Brown University

- **3. Education:**

A.B. in Physics and Mathematics, University of California, Berkeley.

Ph.D. in Physics, University of California, Berkeley.

Thesis Advisor: G.F. Chew

- **4. Professional Appointments:**

Instructor, Physics Department, Princeton University.

Assistant Professor, Physics Department, Brown University.

Associate Professor, Physics Department, Brown University.

Professor, Physics Department, Brown University.

Physics Department Chair, Brown University, 2004-2010.

- **5. Completed Research, Scholarship, etc.**

- Area of Research

Theoretical particle physics; Strong interaction dynamics; Quantum Chromodynamics; Lattice Gauge Theories; Large N Expansion for QCD; S-matrix theory; High-energy multiparticle phenomena; Quark-parton approach to soft hadronic processes; String Theories; Statistical Mechanics of Strings at High Energy Densities, Gauge/String Duality and High Energy Scattering.

- c. List of Publications:(2005–)

173 “High Energy QCD Scattering from String/Gauge Duality”, Acta Phys. Polon. B36: 711-718, 2005

174 “Probing the 5th Dimension with QCD String”, (with R.C. Brower and N. Thompson), Int. J. Mod. Phys. A20: 4508-4517, 2005.

175 “Hard and Soft Collisions in Gauge/String Duality and Pomeron Intercept in Strong Coupling”, (with R.C. Brower), Int. J. Mod. Phys. A20: 4525-4531, 2005.

176 “Non-perturbative Quantum Chromodynamics”, (with B. Muller), Int. J. Mod. Phys. A20: 4363-4697, 2005.

- 178 “Unification of Soft Pomeron and BFKL through AdS/CFT”, (with R. C. Brower), page 359, Proc. of XVIIth Rencontres de Blois: XIth Blois Workshop on Elastic and Diffractive Scattering.
- 179 “The Pomeron and Gauge/String Duality”, (with R.C. Brower, J. Polchinski, and M. Strassler), (hep-th/0603115-JHEP 0712:005, 2007).
- 180 “String/Flux Tube Duality on the Lightcone”, (with R. C. Brower, and C. B. Thorn), (hep-th/0603256, Phys. Rev. D73, 124037 (2006).
- 181 “Small x Behavior of Parton Distributions from the Observed Froissart Energy Dependence of the Deep Inelastic Scattering Cross Section.”, (with M.M. Block and E. L. Berger), hep-ph/0610296, Phys. Rev. Lett. 97, 252003 (2006).
- 182 “Analytic Expression for the Joint x and Q^{*2} Dependences of the Structure Functions of Deep Inelastic Scattering.”, (with E. L. Berger and M.M. Block) . e-Print: hep-ph/0703003. Phys.Rev.Lett.98:242001,2007.
- 183 “Froissart bound in strong coupling limit.”, . Acta Phys.Polon.Supp.1:549-552,2008.
- 184 “On the eikonal approximation in AdS space.” (with R. C. Brower and M. J. Strassler). 21pp. e-Print: arXiv:0707.2408 [hep-th], JHEP 0903:050, 2009.
- 185 “Ultra-high energy neutrino scattering on an isoscalar nucleon.” (with E. L. Berger, M. M. Block, and D. W. McKay) . Aug 2007. 4pp. e-Print: arXiv:0708.1960 [hep-ph].
- 186 “Glueball decay in holographic QCD,” (with K. Hashimoto, S. Terashima), Phys. Rev. D77: 086001, 2008. BROWN HET-1489, UT-KOMABA-07-14, YITP-07-54, Sep 2007. 28pp. e-Print: arXiv:0709.2208 [hep-th]
- 187 “On The Pomeron at Large 't Hooft Coupling.” (with R. C. Brower, M. J. Strassler) e-Print: arXiv:0710.4378 [hep-th], JHEP 0903:092, 2009.
- 188 “Implications of multi-Regge limits for the Bern-Dixon-Smirnov conjecture.” (with Richard C. Brower, Horatiu Nastase, Howard J. Schnitzer), e-Print: arXiv:0801.3891 [hep-th], Nucl. Phys. B814, 293-326, 2009.
- 189 “High Energy Scattering in AdS dual QCD.” (with Richard C. Brower). In the Proceedings of 9th Workshop on Non-Perturbative Quantum Chromodynamics, Paris, France, 4-8 Jun 2007.
- 190 “Analyticity for Multi-Regge Limits of the Bern-Dixon-Smirnov Amplitudes.” (with Richard C. Brower, Horatiu Nastase , Howard J. Schnitzer). e-Print: arXiv:0809.1632 [hep-th], Nucl. Phys. B822: 301-347, 2009.
- 191 “Odderon in Gauge/String Duality.” (with Richard C. Brower, Marko Djuric). e-Print: arXiv:0812.0354 [hep-th], JHEP 0907:063, 2009.
- 192 “Saturation and Confinement: Analyticity, Unitarity and AdS/CFT Correspondence”. (with Richard C. Brower, Marko Djuric). Dec 2008, e-Print: arXiv:0812.1299 [hep-ph], Proc. for ISMD 2008.

- 193 “Elastic and Diffractive Scattering after AdS/CFT” (with Richard Brower, Marko Djuric), Proc. for EDS-2009. e-Print: arXiv:0911.3463 [hep-ph].
- 194 “Moving Forward into the LHC Era.”, 3th International Conference on Elastic and Diffractive Scattering (Blois Workshop) (Mario Deile et al.) Feb 2010. 514pp. e-Print: arXiv:1002.3527 [hep-ph]
- 195 “Pomeron and Odderon: Saturation and Confinement and Gauge/String Duality” (with Richard C. Brower, Marko Djuric). In the Proceedings of 10th Workshop on Non-Perturbative Quantum Chromodynamics, Paris, France, Jun 2009.
- 196 “String-Gauge Dual Description of Deep Inelastic Scattering at Small- x .” (with Richard C. Brower, Marko Djuric, Ina Sarcevic,). Jul 2010. 29pp. Published in JHEP 1011:051, 2010. e-Print: arXiv:1007.2259 [hep-ph]
- 196 “High energy scattering and AdS/CFT.” Prog.Theor.Phys.Suppl.187:189-199,2011.
- 197 “The AdS Graviton/Pomeron Description of Deep Inelastic Scattering at Small x .” (with Richard C. Brower, Marko Djuric, Ina Sarcevic) . Jun 2011. 4pp. Proceedings of 46th Rencontres de Moriond on QCD and High Energy Interactions, La Thuile, Aosta Valley, Italy, 20-27 Mar 2011. e-Print: arXiv:1106.5681 [hep-ph]
- 198 “Small- x Deep Inelastic Scattering via the Pomeron in AdS,” (with R. C. Brower, M. Djuric, I. Sarcevic), arXiv:1204.0472 [hep-ph].
- 199 “Holographic Double Diffractive Production of Higgs and the AdS Graviton/Pomeron,” (with R. Brower, M. Djuric), arXiv:1204.0451 [hep-ph].
- 200 “Diffractive Higgs Production by AdS Pomeron Fusion”. (with Richard C. Brower, Marko Djuric), Feb 2012. 53pp. e-Print: arXiv:1202.4953 [hep-ph]
- 201 “Small- x Deep Inelastic Scattering via the Pomeron in AdS.” (with Richard C. Brower, Marko Djuric, Ina Sarcevic,), e-Print: arXiv:1204.0472 [hep-ph]
- 202 “Holographic Double Diffractive Production of Higgs and the AdS Graviton/Pomeron”, (with Richard Brower, Marko Djuric), arXiv:1204.0451 [hep-ph]
- 203 “Deeply Virtual Compton Scattering and Higgs Production Using the Pomeron in AdS,” (with Richard Brower, Marko Djuric), Temporary entry e-Print: arXiv:1204.0472 [hep-ph].
- 204 “Recurrence Relations of Higher Spin BPST Vertex Operators for Open String,” (with C. H. Fu, J. C. Lee, and Y. Yang), Phys. Rev. D **88** (2013) 046004 [arXiv:1304.6948 [hep-th].
- 205 “BCFW Deformation and Regge Limit,” (with C. H. Fu, J. C. Lee, and Y. Yang), arXiv:1312.1419 [hep-ph].
- 206 “Conformal Pomeron and Odderon in Strong Coupling,” (with R. C. Brower, M. Costa, M. Djuric, T. Raben), arXiv:1312.1419 [hep-ph].

207 “Towards holographic QCD: AdS/CFT, confinement deformation, and DIS at small- x ”, R. C. Brower, M. Djuric, T. Raben and C-I Tan, arXiv: 1412.3443 [hep-th].

208 “Holographic Double Diffraction of Higgs and the AdS Graviton/Pomeron”, R. C. Brower, M. Djuric, T. Raben, and C-I Tan, arXiv :1412.3060”, Int. J. Mod. Phys. A, 29, no. 28, 1446013 (2014).

209 “Strong Coupling Expansion for the Conformal Pomeron/Odderon Trajectories,” (with R. C. Brower, M. Costa, M. Djuric, T. Raben), arXiv:1409.2730 [hep-th].

210 “Towards holographic QCD: AdS/CFT, confinement deformation and DIS at small- x ” (with R. C. Brower, M. Costa, M. Djuric, T. Raben), arXiv:1412.3443, Moriond Proceedings, QCD, 2015.

211 “Quantum Finite Elements for lattice Field Theory” (with R. C. Brower, G. Fleming, A. Gasbarro, T. Raben, E. Weinberg), arXiv:1601.01367, Proceedings of 33rd Int. Symp. on lattice Field Theory, 2016.

212 “Lattice Dirac Fermions on a Simplicial Riemann Manifold” (with R. C. Brower, G. Fleming, A. Gasbarro, T. Raben, E. Weinberg), arXiv:1601.08587.

213 “Inclusive Production Through AdS/CFT” (with Richard Nally, Timothy G. Raben). arXiv:1711.02727, JHEP 1711 (2017) 075.

214 “Inclusive Production Through AdS/CFT” (with Richard Nally, Timothy G. Raben). arXiv:1711.02727, JHEP 1711 (2017) 075.

215 “Lattice Dirac Fermions on a Simplicial Riemannian Manifold” (with Brower, Richard C., Weinberg, Evan S., Fleming, George T., Gasbarro, Andrew D., Raben, Timothy G.), Phys. Rev. D95 (2017) 11,114510.

216 “Shape of Proton and the Pion Cloud” (with Lszl Jenkovszky, Istvn Szanyi), e-Print: arXiv:1710.10594 [hep-ph], Eur. Phys. J.”, A54 (2018) 7-116.

217 “Holographic Inclusive Central Particle Production at the LHC” (with Richard Nally, Timothy Raben), e-Print: arXiv:1711.02727 [hep-ph].

218 “Minkowski Conformal Blocks and the Regge Limit for SYK-like Models” (with Timothy G. Raben) e-Print: arXiv:1801.04208 [hep-th].Phys. RevD. (2018) 10.1103.

219 “Lattice ϕ^4 field theory on Riemann manifolds: Numerical tests for the 2-d Ising CFT on S^2 ”, (with Brower, Richard C. and Cheng, Michael and Weinberg, Evan S. and Fleming, George T. and Gasbarro, Andrew D. and Raben, Timothy G.), Phys. Rev. D98 (2018) 1,014502.

- **j. Recent Research Activities:**

Professor Chung-I Tan’s research program in the recent years has mostly focused on non-perturbative aspects of Quantum Chromodynamics (QCD) and their phenomenolog-

ical consequences at high energies. His current work has taken on a renewed focus due to the Maldacena conjecture of exact Gauge/String duality which now allows explicit calculation in some QCD-like SUSY theories. The application of AdS/CFT correspondence between strongly coupled QCD and weakly coupled gravity has recently been successfully applied to the computation of various observables in high-energy heavy-ion physics. The challenge is to abstract from these models fundamental concepts applicable to QCD, thus allowing one to replace non-perturbative field theory with perturbative string theory.

An important achievement has been the work done in collaboration with J. Polchinski (UC, Santa Barbara), M. Strassler (Rutgers), and R. Brower (Boston) where they demonstrated how String/Gauge Duality can be applicable directly to the study of QCD processes at high energies ¹. Prof. Tan has had a long interest in the phenomenological consequence of such an approach ². Dr. M. Djuric has completed his PhD with Prof. Tan in 2011 and is now a post-doc at U. of Porto. T. Rabin has completed his PhD with Prof. Tan in Jan. 2016, and is now a post-doc at Michigan State U.

Nov. 2018

¹R. C. Brower, J. Polchinski, M. J. Strassler and C. I. Tan, “The Pomeron and Gauge/String Duality,” JHEP **0712**, 005 (2007) [arXiv:hep-th/0603115].

²A. Capella, U. Sukhatme, C. I. Tan and J. Tran Thanh Van, “Dual parton model,” Phys. Rept. **236**, 225 (1994).