



**Philip George
Ratcliffe**

UNIVERSITY OF INSUBRIA



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Contact data

Associate Professor

Department of Physics and Mathematics

via Valleggio 11 - 22100 Como (CO) - Italy

Tel: +39 (031) 2386231

Fax: +39 (031) 2386119

E-mail: philip.ratcliffe@uninsubria.it

Biography

Born in Great Britain on October 3, 1955, Philip G. Ratcliffe completed his early schooling in England, obtaining his first degree in Theoretical Physics from Trinity College (Cambridge University) in 1976. After attending the Diploma course of Imperial College (London University) in Mathematical Physics, he moved on to the International School for Advanced Studies (SISSA, Trieste), where he gained his Doctorate in Physics, Class of Particle Physics, in 1983.

He has been research assistant at Cambridge and London Universities and researcher (Article 36) with the INFN (Istituto Nazionale di Fisica Nucleare), Milan and Turin sections. In 1996 he moved to the School of Sciences in Como, at the University of Insubria, to take up a permanent position as an Assistant Professor in Theoretical Physics. There in 2002 he became Associate Professor of Nuclear and Subnuclear Physics.

His research activities regard elementary-particle physics theory and phenomenology and he has spent periods visiting such institutions and laboratories as CERN, MIT, SLAC, Fermilab, BNL, INT (Seattle) and Paris University. He is author of more than thirty scientific publications in prominent international refereed journals. In particular, he is co-author of a recently published major review article on the subject of transverse spin and of a graduate text-book entitled "Transverse Spin Physics", commissioned by the World Scientific Publishing Co.

In addition, he has published more than forty papers in proceedings of international conferences, at which by specific invitation he has often made general review presentations and concluding summary talks. He has, moreover, co-organised international conferences, workshops and summer schools of which he co-edited the proceedings.

Qualifications and awards

Senior Scholar Trinity College (Cantab.); B.A. & M.A. (Cantab.); Ph.D. SISSA (Trieste).

Research interests

His research activities are centred on the area of theory and phenomenology of elementary particle physics. The common thread of this research, from the period

of his doctorate at the SISSA right up to the recent work during the periods in Milan and Como, is the physics of polarisation or *spin*.

The property, strictly quantum mechanical, of intrinsic spin in both elementary and composite particles, constitutes an important test bench for our theories: spin effects, insofar as they are direct predictions of the underlying quantum field theory, can in fact provide precise tests of the fundamental particle interactions. Indeed, spin has revealed itself to be a very sensitive probe of hadronic structure and the nature of the bound state in quantum chromodynamics (QCD), considered the fundamental theory of the strong interactions. Even now many aspects of the physics of spin at high energy elude satisfactory explanation.

Renewed interest in the theoretical problems of spin has grown in recent years, aroused by the recent results of experiments in various international laboratories (BNL, CERN, DESY, FNAL, JLAB, SLAC) and also by the proposals to realise beams of polarised protons at HERA and LHC and even antiprotons at GSI, Darmstadt. The physics of such projects runs from the problem of the proton spin (and thus of the structure of the bound state in QCD) to precision tests of the Standard Model. This prospect confers great relevance precisely to the phenomenology that he has studied personally for many years.

In September 2005 he chaired the local organisation committee of "The International Workshop on Transverse Polarisation Phenomena in Hard Processes" (Transversity 2005) at Villa Olmo (Como). He is a member of the PAX experimental proposal for GSI, of a Research Project of National Interest (PRIN) and of "Hadron Physics I3" (a European Networking Project of the VI Framework Programme).

Teaching experience and appointments

Courses taught include: Nuclear and Subnuclear Physics I & II, Quantum Physics III, Theoretical Physics and Particle Physics Phenomenology; also Physics I and High-Energy Nuclear Physics at Milan University; Hadronic Physics for the School of Specialisation of the University of Pavia and Introductory Perturbative QCD for the Doctorate School of the University of Milan–Bicocca.

He is Coordinator of the Doctorate Research Degree Course in Physics and member of the Giunta of the Dept. of Physics and Mathematics. He has been tutor to the British Universities Summer School in Theoretical Elementary Particle Physics and is currently co-organiser of the Summer School on LHC Physics held annually in Lecce, Italy.

He also serves on the International Committee of the Annual Advanced Study Institute on Symmetries and Spin, Prague and the Scientific Committee of the Workshop on Monte Carlo, Physics and the Detectors of LHC.

Representative publications

1. V. Barone and PGR: "Transverse Spin Physics" (World Sci., 2003), pp. 294.
2. V. Barone, A. Drago and PGR: "Transverse Polarisation of Quarks in

- Hadrons”, *Phys. Rep.* **359** (2002) 1-168.
3. PGR: “Transversity K Factors for Drell–Yan Processes”, *Eur. Phys. J.* **C41** (2005) 319–325.
 4. PGR: “A Matrix Approach to Numerical Solution of the Dokshitzer–Gribov–Lipatov–Altarelli–Parisi Evolution Equations”, *Phys. Rev.* **D63** (2001) 116004.
 5. I.V. Akushevich, H. Anlauf, É.A. Kuraev, PGR and B.G. Shaikhatdenov: “Triplet Production by Linearly Polarized Photons”, *Phys. Rev.* **A61** (2000) 032703.
 6. A. Ahmedov, I.V. Akushevich, É.A. Kuraev and PGR: “Single-Spin Asymmetries for Small-Angle Pion Production in High-Energy Hadron Collisions”, *Eur. Phys. J.* **C11** (2000) 703–708.
 7. PGR: “SU(3) Breaking in Hyperon Beta Decays: A Prediction for $\Xi^0 \rightarrow \Sigma^+ e^- \bar{\nu}$ ”, *Phys. Rev.* **D59** (1999) 014038.
 8. PGR: “Factorisation in Higher-Twist Single-Spin Amplitudes”, *Eur. Phys. J.* **C8** (1999) 403–408.
 9. PGR: “SU(3)-Breaking Effects in Hyperon Semi-Leptonic Decays and the Extraction of F and D ”, *Phys. Lett.* **B365** (1996) 383–389.
 10. R. Barni, G. Preparata and PGR: “A Simple Explanation of Hyperon Polarization at High p_T ”, *Phys. Lett.* **B296** (1992) 251–255.
 11. G. Preparata, PGR and J. Soffer: “Isospin Violation in Quark–Parton Distributions”, *Phys. Rev. Lett.* **66** (1991) 687–690.
 12. K. Hidaka and PGR “Search for Neutralinos at the Z^0 Peak in the e^+e^- Collider”, *Phys. Lett.* **B252** (1990) 476–480.
 13. G. Preparata, PGR and J. Soffer “Comment on ‘Polarized Strange Quarks in the Proton and the Validity of Quantum Chromodynamics’”, *Phys. Rev. Lett.* **64** (1990) 495.
 14. PGR: “SU(3) Breaking Effects in Hyperon Semi-Leptonic Decays and the EMC/SLAC Proton Spin Measurements”, *Phys. Lett.* **B242** (1990) 271–274.
 15. G. Preparata, PGR and J. Soffer “Where Is the Anomaly of Polarized Deep-Inelastic Scattering? ”, *Phys. Rev.* **D42** (1990) 930–933.
 16. K. Hidaka, H. Komatsu and PGR “Search for Sleptons at the Z^0 Peak in e^+e^- Collider (I)”, *Nucl. Phys.* **B304** (1988) 417–437.
 17. PGR: “Orbital Angular Momentum and the Parton Model”, *Phys. Lett.* **B192**

- (1987) 180–184.
18. PGR: “Transverse Spin and Higher Twist in QCD”, *Nucl. Phys.* **B264** (1986) 493–512.
 19. K. Hidaka, H. Komatsu and PGR “Search for Sleptons and Squarks at the Z^0 Peak in e^+e^- Colliders”, *Phys. Lett.* **B150** (1985) 399–404.
 20. PGR: “Radiative Corrections to the Helicity Asymmetries for the Drell–Yan Process in QCD”, *Nucl. Phys.* **B223** (1983) 45–60.
 21. N.S. Craigie, K. Hidaka and PGR “The Role Helicity Asymmetries Could Play in the Search for Supersymmetric Interactions”, *Phys. Lett.* **B129** (1983) 310–314.
 22. PGR: “Semi-Inclusive DIS and Transversity”, invited plenary talk in proc. of the *Workshop on Nucleon Structure in the High x -Bjorken Region—HiX 2004* (Marseille, July 2004), eds. C. Bourrely, Z.-E. Meziani and J. Softer; *AIP Conf. Proc.* **747** (2005) 133–140.
 23. PGR: “Single-Spin Asymmetries and Transversity”, invited plenary review talk in proc. of the *XV Int. Symp. on High-Energy Spin Physics—SPIN 2002* (Upton/Danvers, Sept. 2002), eds. Y.I. Makdisi, A.U. Luccio and W.W. Mackay; *AIP Conf. Proc.* **675** (2003) 176–185.
 24. PGR: “Theory Summary”, symposium theory summary talk in proc. of the *Hyperon Physics Symp.—Hyperon 99* (Batavia, Sept. 1999), eds. D.A. Jensen and E. Monnier (Fermilab-Conf-00/059-E, 2000), pp. 173–182.
 25. PGR: “Theory of Spin Effects in Hard Hadronic Reactions”, invited plenary review talk in proc. of the *XIII Int. Symp. on High-Energy Spin Physics* (Protvino, Sept. 1998), eds. N.E. Tyurin, V.L. Solovianov, S.M. Troshin and A.G. Ufimtsev (World Sci., 1999), pp. 210–225..
 26. PGR: “Summary Talk”, symposium summary talk in proc. of the *XII Int. Symp. on High-Energy Spin Physics* (Amsterdam, Sept. 1996), eds. C.W. de Jager, T.J. Ketel, P.J. Mulders, J.E.J. Oberski and M. Oskam-Tamboezer (World Sci., 1997), pp. 161–170.
 27. PGR: “A New Quark Model Approach to Hyperon Semi-Leptonic Decays”, invited plenary talk in proc. of the *2nd. Topical Workshop on Deep Inelastic Scattering off Polarized Targets: Theory Meets Experiment* (Zeuthen, Sept. 1997), eds. J. Blümlein, A. De Roeck, T. Gehrmann and W.-D. Nowak (DESY 97-200, 1997), pp. 128–137.
 28. PGR: “Transverse Spin Effects”, invited plenary review talk in proc. of the *2nd. Adriatico Research Conf. on Polarization Dynamics in Nuclear and Particle Physics* (Trieste, Jan. 1992), eds. A.O. Barut, N. Paver, A. Penzo and R. Raczka (World Sci., 1993), pp. 420–429.

29. PGR “High Energy Hadron Interactions Summary”, session summary talk in proc. of the *VIII Int. Symp. on High-Energy Spin Physics* (Minneapolis, Sept. 1988), ed. K.J. Heller; *AIP Conf. Proc.* **187** (1989) 145–148.
30. PGR: “Transverse Polarisation in QCD and Related Problems”, invited plenary review talk in proc. of the *6th. Int. Symp. on High-Energy Spin Physics* (Marseille, Sept. 1984), ed. J. Soffer; *J. Phys. Colloq.* **46** [C2] (1985) 31–43.