University of Oxford

Department of Physics

C6 – Theoretical Physics – Introduction to Quantum Field Theory

Recommended Literature

Please send comments and questions to andrei.starinets@physics.ox.ac.uk

Textbooks often used in modern QFT courses:

M. Peskin and D. Schroder, An Introduction to Quantum Field Theory, Perseus Books, 1995
[This is a standard textbook used in QFT courses worldwide; contains elements of effective theory (a modern QFT paradigm); somewhat phenomenology-oriented]

D. Bailin & A. Love, Introduction to Gauge Field Theory, Taylor & Francis, 1993
[A good, no-nonsense text]

L. Ryder, Quantum Field Theory, Cambridge U. Press, 1985
[A simpler version, perhaps, but contains all essential ingredients; good practical introduction to path integrals in QFT; written for humans; his GR textbook is also useful]

A. Zee, Quantum Field Theory in a Nutshell, Princeton U. Press, 2003
[Belongs to the Immortal Classics category. This is not a comprehensive textbook but rather a collection of important stories explaining in detail the fundamental ingredients of QFT. See also Zee’s similar book on GR. He also wrote an interesting popular book about particle physics called “Fearful Symmetry” – as in William Blake’s Tyger Tyger burning bright, In the forests of the night: What immortal hand or eye, Dare frame thy fearful symmetry?]

S. Coleman, Quantum Field Theory, World Scientific, 2019
[Another Immortal Classics: a collection of notes by the famous physicist and one of the best lecturers on the subject in human history]

S. Coleman, Aspects of Symmetry, Selected Erice Lectures, Cambridge University Press, 1985
[All about spontaneous symmetry breaking and other useful QFT issues from the Master; Immortal Classics]

Other QFT textbooks – modern and not so modern

2000-current

[A comprehensive treatment of QFT; some people like it]

M. Srednicki, Quantum Field Theory, Cambridge U. Press, 2007
F. Gelis, Quantum Field Theory, Cambridge U. Press, 2019
V. P. Nair, Quantum Field Theory, Springer, 2004
T. Lancaster & S. Blundell, Quantum Field Theory for the Gifted Amateur, Oxford U. Press, 2014
M. Maggiore, A Modern Introduction to Quantum Field Theory, Oxford U. Press, 2005
L. S. Schulman, Techniques and Applications of Path Integral, Dover, 2005

1980-2000
M. Le Bellac, Quantum and Statistical Field Theory, Clarendon Press, 1992
F. Mandtl and G. Shaw, Quantum Field Theory, John Wiley & Sons, 1984
P. Ramond, Field theory: a modern primer, Addison-Wesley, 1990
L. S. Brown, Quantum Field Theory, Cambridge U. Press, 1992
W. Greiner and J. Reinhardt, Field Quantization, Springer-Verlag, 1996
V. B. Berestetskii, E. M. Lifshitz, L. P. Pitaevskii, Quantum Electrodynamics: Volume 4 (Course of Theoretical Physics), Pergamon Press, 1982
1950-1980

C. Itzykson and J.-B. Zuber, Quantum Field Theory, McGraw-Hill, 1980


N. N. Bogolyubov and D. V. Shirkov, Introduction to the theory of quantized fields (translation from the Russian), John Wiley & Sons, 1959

A. I. Akhiezer, V. B. Berestetsky, Quantum Electrodynamics (translation from the Russian), U.S. Atomic Energy Commission, 1953

Symmetries, Noether theorems, and the theory of constrained dynamics

K. Sundermeyer, Symmetries in Fundamental Physics, Springer, 2014

K. Sundermyer, Constrained Dynamics, Springer-Verlag, 1982


Non-perturbative QFT

R. Rajaraman, Solitons and Instantons, North-Holland, 1982

[One of the best QFT books ever written – focuses on non-perturbative aspects. Immortal Classics.]


Useful popular books about QFT

S. Schweber, QED and the men who made it, Princeton U. Press, 1994

A. Smilga, Digestible Quantum Field Theory, Springer, 2016

Mathematically rigorous – QFT axiomatics and so on


E.Zeidler, Quantum Field Theory: A bridge between mathematicians and physicists, vols. 1-3, Springer-Verlag, 2006-2011

N.N.Bogolyubov, A.A.Logunov, I.T.Todorov, Introduction to Axiomatic Quantum Field Theory (translation from the Russian), W.A. Benjamin, 1975  
[In my opinion, the best ever book on rigorous QFT]


B.Simon, P(0)2 Euclidean (Quantum) Field Theory, Princeton U. Press, 2015  
[Good luck...]

Mathematical Methods

R.Courant and D.Hilbert, Methods of Mathematical Physics, volumes I, II, Wiley-Blackwell, 1966

P.Morse and H.Feshbach, Methods of Theoretical Physics, volumes I, II, McGraw Hill, 1953

[To date, this is the most complete collection of integrals, series and products in the world]

A. P. Prudnikov, Y.A. Brychkov, O.I. Marichev, Integrals and Series, volume II: Special Functions (translation from the Russian), Gordon and Breach, 1986


E.Kamke, Differentialgleichungen: Loesungsmethoden Und Loesungen (in German), Chelsea Publishing Company, 1982  
[The best ever collection of solutions to ODE; Immortal Classics; no English translation exists]
C.Lanczos, The variational principles of mechanics, Dover, 1986

**Online courses**

Some QFT courses are now available online. For example, MIT lectures depositary is a good resource:

[https://ocw.mit.edu/courses/](https://ocw.mit.edu/courses/)

In particular, Ian Stewart’s lectures on effective field theory are very useful: