

Recommended References by Project

Supplementary reading list for MSc Projects (Physics & Engineering Physics). Each project builds on the foundation provided by Thorne & Blandford, with additional key and advanced references.

Project 1. Geometric Ensemble Analysis

- Main References:

Thorne & Blandford, **Modern Classical Physics**.

V.I. Arnold, **Mathematical Methods of Classical Mechanics** (Springer).

- Supplementary References:

S.R. de Groot & P. Mazur, **Non-Equilibrium Thermodynamics** (Dover).

T. Padmanabhan, **Thermodynamics and Statistical Mechanics** (Cambridge).

Level: Foundational

Project 2. Statistical Thermodynamics with Curvature

- Main References:

Thorne & Blandford.

R.M. Wald, **General Relativity** (Chicago).

- Supplementary References:

T. Padmanabhan, **Thermodynamical Aspects of Gravity**, Rep. Prog. Phys. 73, 046901 (2010).

Level: Intermediate

Project 3. Black Hole Thermodynamics: Statistical Perspective

- Main References:

Thorne & Blandford.

R.M. Wald, **Quantum Field Theory in Curved Spacetime and Black Hole Thermodynamics** (Chicago).

- Supplementary References:

T. Padmanabhan, **Thermodynamical Aspects of Gravity**, Rep. Prog. Phys. 73, 046901 (2010).

Level: Advanced

Project 4. Random Processes & Langevin Dynamics

- Main References:

Thorne & Blandford.

N.G. van Kampen, **Stochastic Processes in Physics and Chemistry** (North-Holland).

- Supplementary References:

C.W. Gardiner, **Stochastic Methods** (Springer).

H. Risken, **The Fokker–Planck Equation** (Springer).

Level: Intermediate

Project 5. Fluctuation–Dissipation Theorem

- Main References:

Thorne & Blandford

R. Zwanzig, **Nonequilibrium Statistical Mechanics** (Oxford).

- Supplementary References:

M. Kardar, **Statistical Physics of Particles** (Cambridge).

Level: Intermediate

Project 6. Statistical Mechanics of Self-Gravitating Systems

- Main References:

Thorne & Blandford

J. Binney & S. Tremaine, **Galactic Dynamics** (Princeton).

- Supplementary References:

D. Lynden-Bell & R. Wood, MNRAS 138, 495 (1968).

Level: Advanced

Project 7. Equations of State from Virial Expansion

- Main References:

Thorne & Blandford

D.A. McQuarrie, **Statistical Mechanics** (Harper & Row).

- Supplementary References:

J.P. Hansen & I.R. McDonald, *Theory of Simple Liquids* (Academic).

Level: Intermediate

Project 8. Transport Coefficients from Green–Kubo Relations

- Main References:

Thorne & Blandford

J.P. Hansen & I.R. McDonald, *Theory of Simple Liquids* (Academic).

- Supplementary References:

R. Zwanzig, *Nonequilibrium Statistical Mechanics* (Oxford).

Level: Intermediate

Project 9. Kinetic Theory and the Boltzmann Equation

- Main References:

Thorne & Blandford

E.M. Lifshitz & L.P. Pitaevskii, *Physical Kinetics* (Pergamon).

- Supplementary References:

K. Huang, *Statistical Mechanics* (Wiley).

Level: Intermediate

Project 10. Critical Phenomena and Equations of State Near Phase Transitions

- Main References:

Thorne & Blandford

K. Huang, *Statistical Mechanics* (Wiley).

- Supplementary References:

M.E. Fisher, Rev. Mod. Phys. 46, 597 (1974).

M. Kardar, *Statistical Physics of Fields* (Cambridge).

Level: Intermediate

Project 11. Cosmological Phase Transitions and Topological Defects

- Main References:

Thorne & Blandford

E.W. Kolb & M.S. Turner, *The Early Universe* (Addison–Wesley).

- Supplementary References:

A. Vilenkin & E.P.S. Shellard, *Cosmic Strings and Other Topological Defects* (Cambridge).

Level: Advanced

Project 12. Dark Energy & Effective Equations of State

- Main References:

Thorne & Blandford

S. Weinberg, *Cosmology* (Oxford).

- Supplementary References:

Planck Collaboration, A&A 641, A6 (2020).

Level: Intermediate

Project 13. Cosmic Microwave Background Fluctuations

- Main References:

Thorne & Blandford

S. Dodelson, *Modern Cosmology* (Academic).

- Supplementary References:

Planck Collaboration, A&A 641, A6 (2020).

Level: Advanced

Project 14. Bose–Einstein Condensation and Finite-Size Effects

- Main References:

Thorne & Blandford

C.J. Pethick & H. Smith, *Bose–Einstein Condensation in Dilute Gases* (Cambridge).

- Supplementary References:

L. Pitaevskii & S. Stringari, *Bose–Einstein Condensation and Superfluidity* (Oxford).

Level: Intermediate

Project 15. Superfluid Hydrodynamics & Quantized Vortices

- Main References:

Thorne & Blandford

L.D. Landau & E.M. Lifshitz, *Fluid Mechanics*, Ch. XVII.

- Supplementary References:

A.J. Leggett, *Quantum Liquids* (Oxford).

Level: Advanced

Project 16. Quantum Phase Transitions in Lattice Models

- Main References:

Thorne & Blandford

S. Sachdev, *Quantum Phase Transitions* (Cambridge).

- Supplementary References:

J. Cardy, *Scaling and Renormalization in Statistical Physics* (Cambridge).

Level: Advanced