Electromagnetism

Università degli studi di Roma "La Sapienza" Physics and Astrophysics BSc

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Notes on Electromagnetism

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Version 0.1

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Bibliography

- [Gri17] D. J. Griffiths. *Introduction to Electrodynamics*. Cambridge University Press, 2017. isbn: 978-1-108-42041-9.
- [Jac98] J. D. Jackson. *Classical Electrodynamics*. John Wiley and Sons, Inc., 1998. isbn: 0-471-30932-X.
- [LL71] L. D. Landau and E. M. Lifshits. *Course of Theoretical Physics, Vol.2, The Classical Theory of Fields*. MIR, 1971.
- [Zan12] A. Zangwill. *Modern Electrodynamics*. Cambridge University Press, 2012. isbn: 978-0-521-89697-9.