Master of Science
in Mathematical and Theoretical Physics
String Theory I Mini-project

Topic: Path integral quantisation in string theory

Write a report on the covariant path integral quantisation of the bosonic string. Your report must include a description of the Faddeev-Popov gauge fixing and the cancelation of the Weyl anomaly. If you wish, you can try to include a discussion of the the BRST quantisation even if, due to length constraints, it is only brief.

The path integral quantisation is described in many textbooks. Good examples are:

- M. Green, J. Schwarz and E. Witten, *Superstring theory Vol 1*, Section 3.1, and for the BRST quantisation Section 3.2. This reference is a good starting point and contains material you can try to cover.
- J. Polchinski, *String theory Vol 1*, Sections 3.1-3.4. Chapter 4 contains the BRST quantisation.
- R. Blumenhagen, D. Lüst and S. Theisen, *Basic concepts in string theory*, Section 3.4. Chapter 5 contains the BRST quantisation.

Original references are for example:

- A.M. Polyakov, *Quantum geometry of bosonic strings*, Phys Lett **103B**, 211 (1981)
- M. Kato, K. Ogawa, *Covariant quantisation of string based BRST invariance*, Nucl Phys **B212**, 443, (1983).

Your report should be 10–15 pages, in standard report spacing. More precisely the report should use an 11 point font and the pages should have 1 inch margins. In your report indicate explicitly which ideas come from existing sources, and if appropriate which are original. You should also make appropriate attribution for all of your sources. The report should not be merely a repetition of the lectures or of standard textbook treatments, but, ideally, should include also original research papers. Your report need not contain original research.