Title: Gravitational waves from the early universe

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The authors have improved the lecture notes, and the addition of material on interferometers and pulsar timing is welcome. An explanation of the Hellings-Downs curve is very topical in view of the latest results strongly supporting the presence of a stochastic GW background.

However, the level of the discussion is still uneven, and there are still quite a few places, listed below, where these notes do not meet the criteria of being correct, systematic and intelligible. i regret that I cannot recommend the notes for publication in SciPost.

1. Abstract. It would be an exaggeration to say that "each one of these models has a gravitational wave density spectrum".

2. The tone of the first section may be more appropriate in a public talk. The first sentence is misleading: the review is not about the formation of the first galaxies. The third sentence lacks a verb. There are lapses into pop mode here and elsewhere: "pigeon poop", "not all hope is lost", and over-use of exclamation marks.

3. Notation is used without or before being defined. The over-arrow on $\vec{\xi}$ on p7, the projector $\Lambda_{\mu\nu,\rho\sigma}$ on p8, the basis vector $\hat{e}_\nu$ on p9.

4. p14. Coarse (not course) graining. An equation in the footnote without explanation is not very helpful, and it looks like k is being raised to the sixth power.

5. p15. The notation $h_a(\vec{k})$ and $h_a(k)$ doesn't distinguish the two quantities well. Here the over-arrow means a 3-vector, I think.

6. p16. In equation (3.33), is that the one-sided power spectral density? This should be made clear. An important feature of the modes of a stochastic GW background, besides magnitude and direction, is the phase. It would be helpful to define "gaussian": is this an essential feature? There is a passing reference to popcorn noise later on. It would also help to know what the authors mean by astrophysical and cosmological. The diagram in Figure 5 is too simple to convey useful information to the intended audience.

7. p17. There is at least one good candidate for a BH-NS merger, which is not clear from the description of the transients. Hellings-Downs correlation is introduced without being defined, or flagged as being studied later. Space-borne, not space-born. It is not usual to call space-based GW observatories "interferometers", as time-delay interferometry is very different from the interferometry in ground-based detectors.

8. p18. LIGO is described as "two pair" of interferometers, when it is two interferometers each with two arms. "Power recycling mirrors" are not discussed, so writing the words doesn't help to understand the high power in the cavity.

9. p19. Pulsar timing arrays are not interferometers. "The smaller the frequency the larger the arm" here I think the authors could reverse the order, and give a phase explaining why. Taiji and TianQin should be added to the list of future spaced-based GW observatories.

10. p21. "We also expect to find some noise." It would help to explain what is meant by noise, and give some indications of its physical origin. The notation α, β to label instruments is not explained well. In equation 4.8, and elsewhere, inequality symbols are used instead of angle brackets.

11. p22. It is again incorrectly stated that pulsars can be seen as Michelson interferometer. It would be better to say that pulsars are "like" regular lighthouses: the emission is generally not in the visible part of the spectrum, and perhaps a better simile is a clock, as pulsars are not used to navigate. Describing the effect of GWs on the photon path as "interference" is misleading.

12. p23. The explanation of pulsar timing models is very sketchy, and doesn't explain what any of the "corrections" are.

13. p24. Immediately following is another paragraph about parameter estimation, which is equally sketchy. It is really just a few key words and references, without explanation of what the key words mean. Hellings-Downs is again mentioned without explanation. $\hat{e}^a_{ij}$ is not defined.

14. p25. The overlap reduction function Γ is defined very implicitly

15. p31. The footnote appears to imply that the GW signal is not weak. What is meant here, and what is suppressed by $1/a^2$?

16. p32. There is no need to show all the steps in (5.19).

17. p42. A discussion of the diagrams involved in GW production at second order is not very useful in a footnote, without a diagram.

18. p43. Figure 17 is rather misleading, as it seems to imply that the critical point of the liquid-vapour transition is only just above 1 atm. No symmetries need to be broken at a first order transition (the liquid-vapour transition in water is an example).