Gravitational Waves from a post-inflationary inflationary regime

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Abstract

In this paper we study the gravitational wave spectrum of a post-inflationary universe in a modified expansion, with a massive scalar particle in the phase space. In this case, the post-inflationary universe undergoes a rapid expansion, which can be described by a cosmic string. The rapid expansion can be analyzed by the cosmological constant, which can be used to identify the post-inflationary expansion. The expansion can be described by the cosmological constant, which can be used to identify the post-inflationary expansion. The post-inflationary expansion can be used to find the vacuum energy density for the inflationary universe. The vacuum energy density is calculated from the long-wavelength part of the gravitational wave spectrum and the surface scattering amplitude of the gravitational waves. The results are compared with the results of the cosmological constant expansion, and it is found that the vacuum energy density is deviated from the expected value of the expected value for the post-inflationary expansion. The result is that the vacuum energy density of post-inflationary universe is similar to the vacuum energy density of the universe of a flat universe.

1 Introduction

In this paper we present the gravitational wave spectrum of a post-inflationary inflationary universe. In this scenario a massive scalar particle in the phase space of the post inflationary inflationary universe becomes a gravitational wave, which is a non-zero function of the mass of the particle. In this scenario, the post-inflationary inflationary universe undergoes a rapid expansion. The rapid expansion can be described by a cosmic string. The accelerated expansion can be divided in two parts. The third part can be used to identify the inflationary expansion in the post-inflationary universe. The second part can be used to find the post-inflationary expansion of the inflationary universe. The vacuum energy density is a function of the mass of the particle, which is a function of the mass of the particle. In this case, the post-inflationary expansion is a function of the mass of the particle. The vacuum energy density can be calculated from the above equations. The inflationary expansion is given by Eq.([3.2]). The post-inflationary expansion is given by Eq.([3.3]). The post-inflationary expansion is given by Eq.([3.4]). We will now discuss the inflationary expansion associated with the non-abelian cosmologies ([3.5]) and ([3.6]) and the vacuum energy density. The inflationary expansion is given by Eq.([3.5]) and the post-inflationary expansion is given by Eq.([3.6]). The inflationary expansion is given by Eq.([3.7]) and the post-inflationary expansion is given by Eq.([3.8]) The inflationary expansion is given by Eq.([3.9]) and the post-inflationary expansion is given by Eq.([3.10]) The inflationary expansion is given by Eq.([3.11]) and the post-inflationary expansion is given by Eq.([3.12]) The inflationary expansion can be calculated from Eq.([3.5]) and Eq.([3.13]) and the post-inflationary expansion is given by Eq.([3.14]) and Eq.([3.15]) and the vacuum energy density is a function of the mass of the particle, which is a function of the mass of the particle. In this case, the inflationary expansion is a function of the mass of the particle. The vacuum energy density can be calculated from Eq.([3.5]) and Eq.([3.16]) and the inflationary expansion is given by Eq.([3.17]) The inflationary expansion is given by Eq.([3.18]) and the post-inflationary expansion is given by Eq.([3.19]) The inflationary expansion is given by Eq.([3.20]) and the post-inflationary expansion is given by Eq.([3.20]) The inflationary expansion is given by Eq.([3.21]) and Eq.([3.22]) The inflationary expansion is given by Eq.([3.23]) and the post-inflationary expansion is given by Eq.([3.24]) The inflationary expansion is given by Eq.([3.25]) and the post-inflationary expansion is given by Eq.([3.25])

2 Long-wave model

We start with the equation

$\mathrm{E}_{\mu\nu} = E_{\mu\nu} + \sim \int d't \; E_{\mu\nu} + D\, t \;\; E_{\mu\nu}$

where $\Gamma isthecosmologicalconstant.Thismeansthatcanbereadas$

$$\tau^{(1)} = \tau \int d'tau\, E_{\mu\nu} + D\, tau\, E_{\mu\nu} \qquad (1)$$

$where\tau isthecosmologicalconstant \triangleright Thesecondtermintheaboveequationhasthe form$

$$\tau \int d'tau \;\, E_{\mu\nu} \qquad (2)$$

$Thethirdtermintheaboveequationisthenon\text{›}perturbativeenergy\text{‹}\Gamma andE_{\mu\nu}arethe post\text{›}inflationaryandpre\text{›}inflationaryorigins \triangleright Thefourthtermintheaboveequa\text{›} tionistheinflationarycosmologicalconstant\tau whichcanbewrittenintermsofthe non\text{›}perturbativeenergy\Gamma andE_{\mu\nu}\text{‹}$

$$\tau \int d'tau\, E_{\mu\nu} \qquad (3)$$

$where\tau isdefinedby$

$\tau = \tau \int d'tau\, E_{\mu}$

3 Vacuum energy density

$Thevacuumenergydensitycanbecalculatedusingthefollowingformula$

$$\big(\tau_\omega, \pi^2\tau_\omega, \tau_\omega \qquad (4)$$

4 Curlings

Weareinterestedinthecatalogofthepost›inflationaryexpansionoftheuniverse fromthepointofviewofcosmology▷Weconsidertwomodelsofinflationarycosmol› ogy▷Theinflationaryoneistheonewithanakedsingularityattheoriginofinflation‹ whiletheinflationaryonehasaninflationarycosmologywithanextradimension andacosmologicalconstant♭1♯▷Inthiscase‹theinflationaryexpansioncanbean› alyzedbythecosmologicalconstantandtheinflationaryexpansioncanbeusedtofind thevacuumenergydensity▷Thevacuumenergydensityiscalculatedbythelong›wave withtheinflationarycosmologicalconstant♭2♯▷

Theinflationarymodelcanbeusedasthemodelofchoicefortheinflationarymodel‹ basedonthepresenceofinflationarycosmologiesandafterinflationarycosmolo› giesinaone›loopsuper›Reissner›Nordstrmmodel▷Inthispaperwewillfocusonthe inflationaryinflationarymodeloftheinflationarymodel▷Inthismodel‹theinfla› tionarycosmologiesaredescribedbyacosmologicalconstantwithacosmologicalcon› stantofcosmologicallyequivalentlength♭3♯andtheinflationaryexpansioncanbe analyzedbycosmologicalconstant‹whichhastheform.

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5 Conclusions

Wehavelookedatthepost›inflationaryexpansionoftheuniversefromtheCosmo› logicalConstantperspective▷Thisviewpointcanbeappliedtothepost›inflationary expansionoftheuniverseinthepost›BigBangscenario▷Thepost›inflationaryex› *pansioncanbeusedtofindthevacuumenergydensityinthepost›BigBangscenario‹ whichcanbeusedtoidentifythepost›inflationaryexpansionfromtheCosmolog› icalConstantperspective▷Thepost›inflationaryexpansioncanbeusedtofindthe vacuumenergydensityinthepost›BigBangscenario‹whichcanbeusedtoidentify thepost›inflationaryexpansionfromtheCosmologicalConstantperspective▷The post›inflationaryexpansioncanbeusedtofindthevacuumenergydensityforthe inflationaryuniverse‹whichcanbeusedtoidentifythepost›inflationaryexpansion fromtheCosmologicalConstantperspective▷Thepost›inflationaryexpansioncan beusedtoidentifythevacuumenergydensityfortheinflationaryuniverse‹which canbeusedtoidentifythepost›inflationaryexpansionfromtheCosmologicalCon› stantperspective▷Thepost›inflationaryexpansioncanbeusedtofindthevacuum energydensityfortheinflationaryuniverse‹whichcanbeusedtoidentifythepost› inflationaryexpansionfromtheCosmologicalConstantperspective▷Thepost›inflationary expansioncanbeusedtofindthevacuumenergydensityfortheinflationaryuniverse‹ whichcanbeusedtoidentifythepost›inflationaryexpansionfromtheCosmolog› icalConstantperspective▷Thepost›inflationaryexpansioncanbeusedtofindthe vacuumenergydensityfortheinflationaryuniverse‹whichcanbeusedtoidentify thepost›inflationaryexpansionfromtheCosmologicalConstantperspective▷The post›inflationaryexpansioncanbeusedtoresolvethevacuumenergydensityforthe inflationaryuniverse‹whichcanbeusedtoidentifythepost›inflationaryexpansion fromtheCosmologicalConstantperspective▷Thepost›inflationaryexpansioncan beusedtoresolvethevacuumenergydensityfortheinflationaryuniverse‹whichcan beusedtoidentifythepost›inflationaryexpansionfromtheCosmologicalConstant perspective▷Thepost›inflationaryexpansioncanbeusedtofindthevacuumenergy densityfortheinflationaryuniverse‹whichcanbeusedtoidentifythepost›inflationary expansionfromtheCosmologicalConstantperspective▷Thepost›inflationaryex› pansioncanbeusedtoresolvethevacuumenergydensityfortheinflationaryuniverse‹ whichcanbeusedtoidentifythepost›inflationaryexpansionfromtheCosmolog› ical*

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TheauthorisgratefultoI▷Daraghchi‹P▷K▷M▷SeibergandM▷S▷Nayeriforuse› fuldiscussions▷TheworkwassupportedbytheMinistryofEducation‹Researchand Culture▷TheworkwasalsosupportedbytheresearchgrantsfromtheIndianResearch Council‹theMinistryofEducation‹ResearchandCultureandCFT›NIRS▷A▷M▷ isgratefultoI▷Daraghchi‹P▷K▷M▷SeibergandM▷S▷Nayeriforthekindhospital› *ity▷S▷M▷Nayeriisgratefulto M▷S▷Nayeriforthekindhospitalityfordiscussions▷ S▷M▷NayeriacknowledgesthesupportoftheAssociationofIndianResearchCoun›cilsfortheresearchinthismanuscript▷*

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*I▷DaraghchiisgratefultoY▷Honjima‹P▷K▷M▷Seiberg‹M▷S▷NayeriandI▷ H▷Yajimaforfruitfuldiscussions▷Thisworkwaspartiallysupportedbythegrant forResearchonthePost›InflationaryExplosiveCosmology‹NationalResearch Council‹No▷*23›2196▷

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7 Appendix

Thepost›inflationarymodelcanbeusedtoresolvethetensionofthepost›inflationary inflationarymodel▷Thepost›inflationaryinflationarymodelcanbedescribedby acosmicstring▷Therapidexpansioncanbeanalyzedbythecosmologicalconstant‹ whichcanbeusedtoidentifythepost›inflationaryexpansion▷Therapidexpansion canbeusedtofindthevacuumenergydensityfortheinflationaryuniverse▷Avac›uumenergydensityforinflationiscalculatedbythecosmologicalconstant‹which canbeusedtoidentifythepost›inflationaryinflationaryexpansion▷Thevacuum energydensityisgivenby

$$V(0) = \pi\pi \cdot \tag{5}$$

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TheauthorisgratefultotheMinisteriodeCienciaforprovidingmewithacopyofthe statisticalinformation▷TheauthorisindebtedtoM▷BarbozaandS▷Dragofordis›cussions▷Inconclusion‹IwouldliketothankA▷Bazzani‹M▷CorreaandE▷Guerra *forfruitfuldiscussions▷IwouldalsoliketothankthemembersoftheC▷BitzGroup fortheirhospitalityandsupportduringmystayintheC▷BitzCenter▷*

9 Conflict of Interest Statement

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