博士論文公聴会の公示（物理学専攻）

学位申請者：Allan Alinea

論文題目： Inflationary Universe: Power Spectra in Single-Field Inflation and Adiabatic Regularization
（インフレーション宇宙論：単一スカラー場インフレーションにおけるパワー・スペクトルと断熱正則化）

日時 ：2017年 2月 6日 （月） 16:20－17:50

場所 ： 理学研究科H棟7階7階セミナー室（H701号室）

主査 ：細谷 裕

副査 ：窪田高弘、長峯健太郎、尾田欣也、田中実

論文要旨:

The power spectrum of primordial cosmological perturbations is one of the most important physical quantities in inflationary cosmology. From a mathematical and field-theoretic perspective, self-consistency requires that two-point function of these perturbations and the power spectrum are divergence-free. In this work, we characterize the divergences present in one implementation of a promising semi-analytical method for calculating the (“bare”) power spectrum, namely, uniform approximation. Our analysis indicates that all divergences in the calculation for minimally coupled general single-field inflation, are logarithmic in nature, and that the power spectrum is only finite up to second order in the slow-roll parameters. In addition to this, we perform adiabatic regularization of the power spectrum in two generalizations of the canonical inflation model covering minimally and nonminimally coupled cases. In both of these cases, we find that the physical power spectrum converges to the “bare” power spectrum. This justifies the use of the “bare” power spectrum in standard calculations in inflationary cosmology.