Hubble Space Telescope

Cycle 16 AR Proposal

New Synthesis Models of the Extragalactic Ionizing Background

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Scientific Category: QUASAR ABSORPTION LINES AND IGM

Scientific Keywords: RADIATIVE TRANSFER, LYMAN-ALPHA FOREST CLOUDS, INTERSTELLAR AND INTERGALACTIC MEDIUM, HIGH REDSHIFT GALAXIES, METAL ABSORPTION SYSTEMS

Total Budget Amount: $90,000

Theory: Yes

Abstract

The intergalactic medium (IGM) contains evidence of the epochs of galaxy formation, metal enrichment, reionization, and reheating of the baryons left over from the Big Bang. Hydrogen, helium, and many heavy elements (C, Si, N, 0) observed by Hubble through quasar absorption line studies are kept highly ionized by the extragalactic UV/soft X-ray background (UVB) from active nuclei and star-forming galaxies. The spectrum and intensity of the UVB is one of the most uncertain yet critically important astrophysical input parameters into cosmological simulations of the IGM.

It provides the ionization corrections needed for interpreting QSO absorption-line data and derive crucial information on the distribution of primordial baryons and of the nucleosynthetic products of star formation. We propose here to build improved synthesis models of the UVB intensity, spectrum, and evolution with redshift using the radiative transfer code CUBA, updating and extending our previous results (Haardt & Madau 1996). We will adopt up-to-date determinations of the quasar optical/X-ray luminosity functions and intrinsic spectra, intergalactic photoelectric absorption, and cosmic star formation history from GOODS/ACS data. This research will make use, enhance the value of and have a lasting benefit for past and observational programs with the HST. We will make the latest version of CUBA freely available for public use, allowing for several user-supplied quantities such as source emissivity

as a function of frequency and redshift, and amount of intervening absorption.

Investigators:

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Number of investigators: 2

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Dataset Summary:

Instrument	No. of Datasets	Retrieval Method	Retrieval Plan
GHRS	3	FTP	Data retrieval is not the main aim of this proposal.
FOS	2	FTP	Data retrieval is not the main aim of this proposal