

February 28, 2024

To: Dr. Mark Clampin, APD Director, NASA SMD
Cc: Dr. Patrick Slane, Director, Chandra X-ray Center
Subject: Chandra Funding and Time Domain and Multi-Messenger Science

Dear Dr. Clampin,

The field of time domain and multi-messenger astronomy (TDAMM) is poised to revolutionize our understanding of the universe. The origin of heavy elements in explosive phenomena and mergers of neutron stars, the impact of stellar flares on planetary habitability, the nature of accretion onto black holes and their jets that shape host galaxies and clusters, and the nature and location of black hole mergers all compel the field to study the entire sky at a high cadence. It is the difference between photography and videography.

No effort better encapsulates the quantum leap that is about to unfold than the Rubin/LSST Observatory, now slated to begin survey operations in late 2025. Some estimates anticipate over 200,000 transient identifications every night, from phenomena in our own galaxy and the distant universe. Rubin/LSST will open a discovery space, wherein X-ray observations will enable physical insights into the most extreme phenomena. Many optically selected transients may be intrinsically faint in X-rays, others will be faint by virtue of their distance. Sharp spatial resolution and superb flux sensitivity are the keys. With its 0.7 arc second spatial resolution, and flux sensitivity reaching orders of magnitude lower than other telescopes, Chandra is uniquely able to find sources within crowded extragalactic fields.

Especially as Rubin/LSST operations begin, it is essential that Chandra be supported by NASA, with enough FTE support to enable flexible observations including targets of opportunity that respond to prompts from Rubin/LSST and other notifications. Indeed, the interwoven ecosystem of TDAMM astronomy has been built on the premise that arc second imaging will be possible in X-rays. Ensuring that Chandra is a robust, flagship observatory through the first few years of Rubin/LSST is essential to realize the full potential of TDAMM. It will ensure that NASA plays a key role when international missions such as ULTRASAT launch.

We are aware that NASA now faces a very difficult budget situation, and we are also aware that new missions are in need of vigorous support as well. Without Chandra, our understanding of the breakthrough neutron star merger event GW170817 would not be what it is today. That event is but a taste of what is to come. Failing to fund Chandra at levels that enable rapid, flexible scheduling and community participation in the resulting science will significantly diminish TDAMM - a field prioritized by the Astro 2020 Decadal Survey - just as it is poised to explode. We urge you to find a means of keeping Chandra vibrant so that it can fulfill its role within a new scientific landscape.

Thank you for your consideration,

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