

Designing Large-scale Active Galactic Nuclei Variability Surveys

Viraja Khatu^{1,2}, Sarah Gallagher^{1,2,3}, Patrick Côté⁴, Chris Willott⁴, Aaron Sigut¹, Patrick Hall⁵, Gordon Richards⁶, and John Hutchings⁴

¹The University of Western Ontario, ²Institute for Earth & Space Exploration, ³Canadian Space Agency (CSA), ⁴National Research Council Canada's Herzberg Astronomy and Astrophysics Research Centre, ⁵York University, ⁶Drexel University



INTRODUCTION

Active galactic nuclei (AGN) are **supermassive black holes surrounded by an accretion disk** that reside at the centres of massive galaxies. Owing to their small angular size on the sky, we rely on time-domain studies to probe the size scales of AGN.

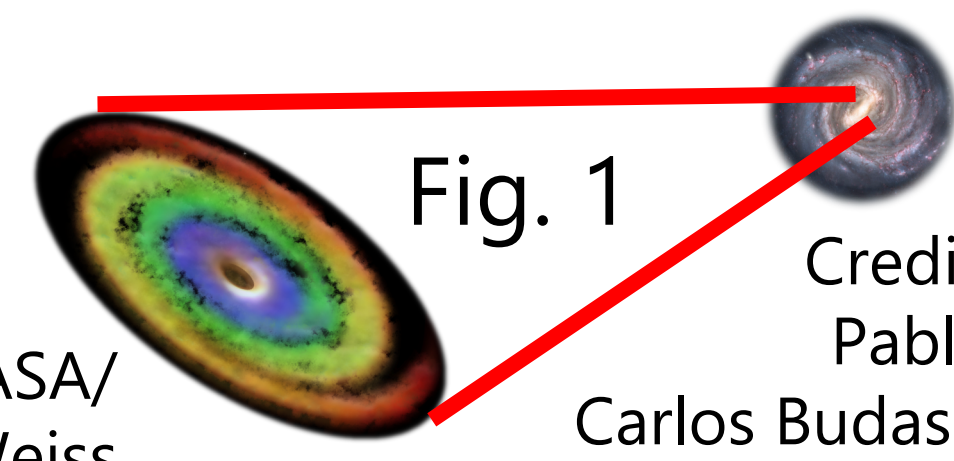


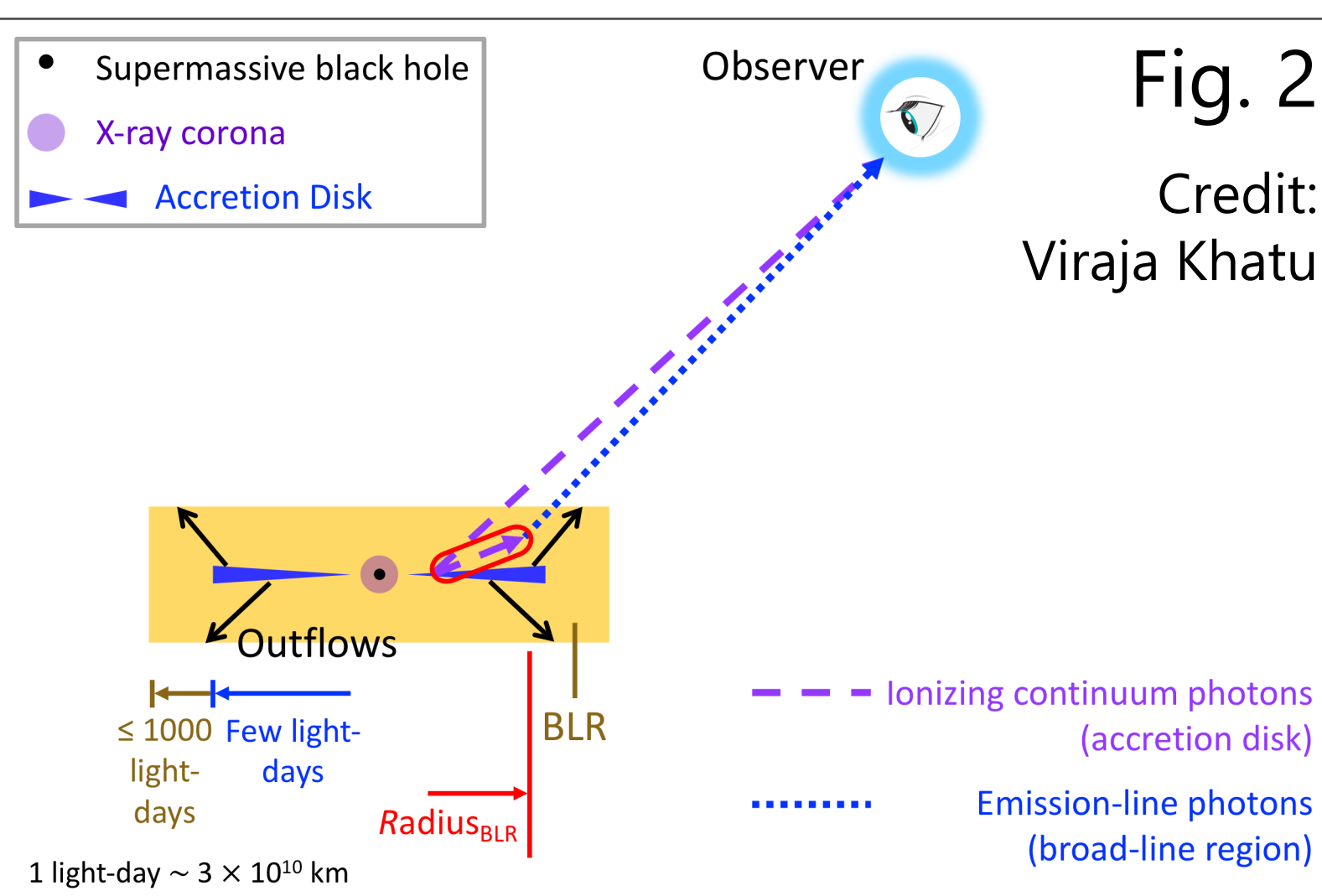
Fig. 1

Credit: Pablo Carlos Budassi

Credit: NASA/CXC/M. Weiss

TECHNIQUE

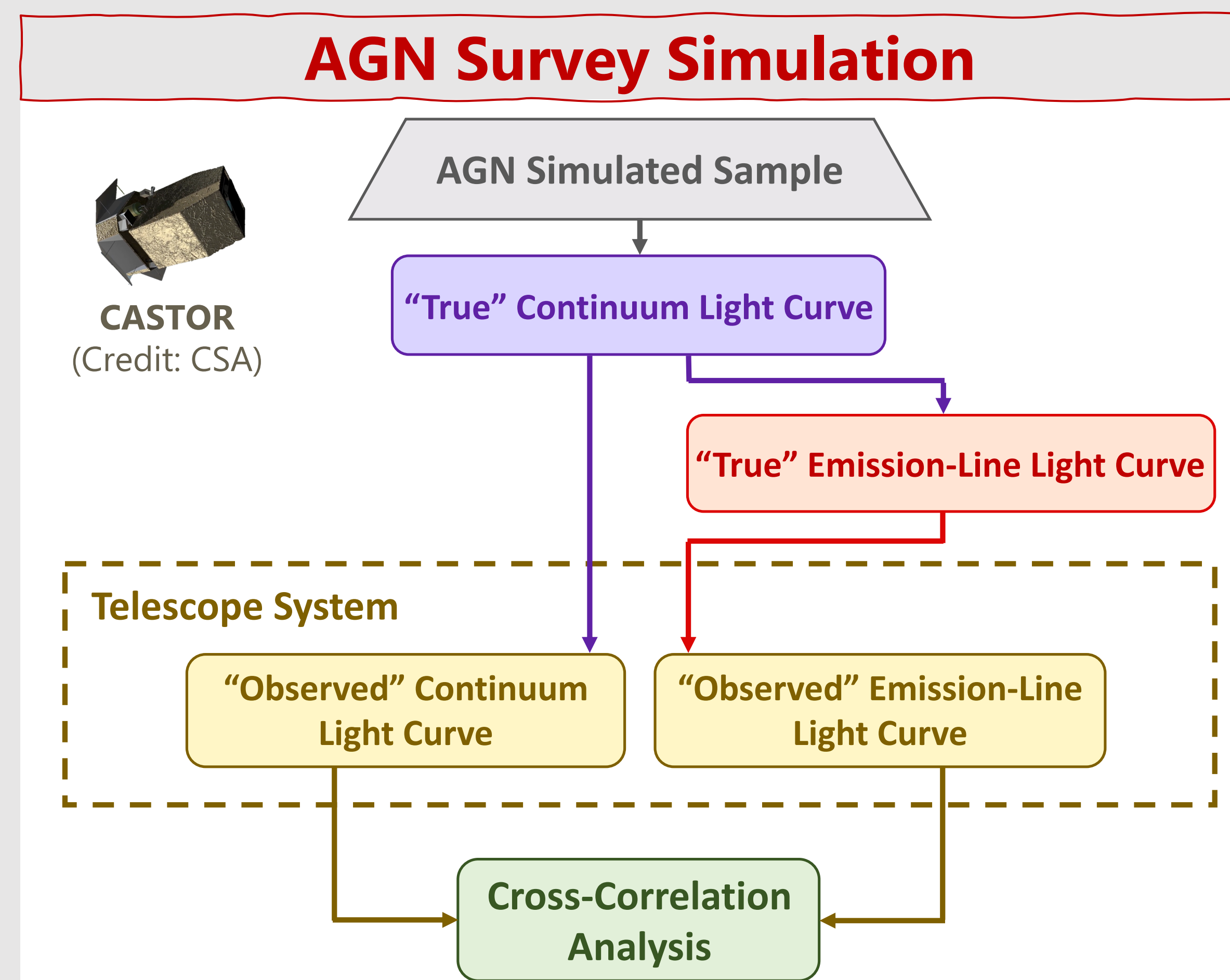
Reverberation mapping takes advantage of variability in AGN over several timescales to probe their size scales.



SCIENCE QUESTION

How supermassive black holes **grow** over cosmic times?

AGN Survey Simulation



Credit: Viraja Khatu

Fig. 3

ILLUSTRATIONS

High-luminosity, high-redshift AGN need **longer campaigns**.

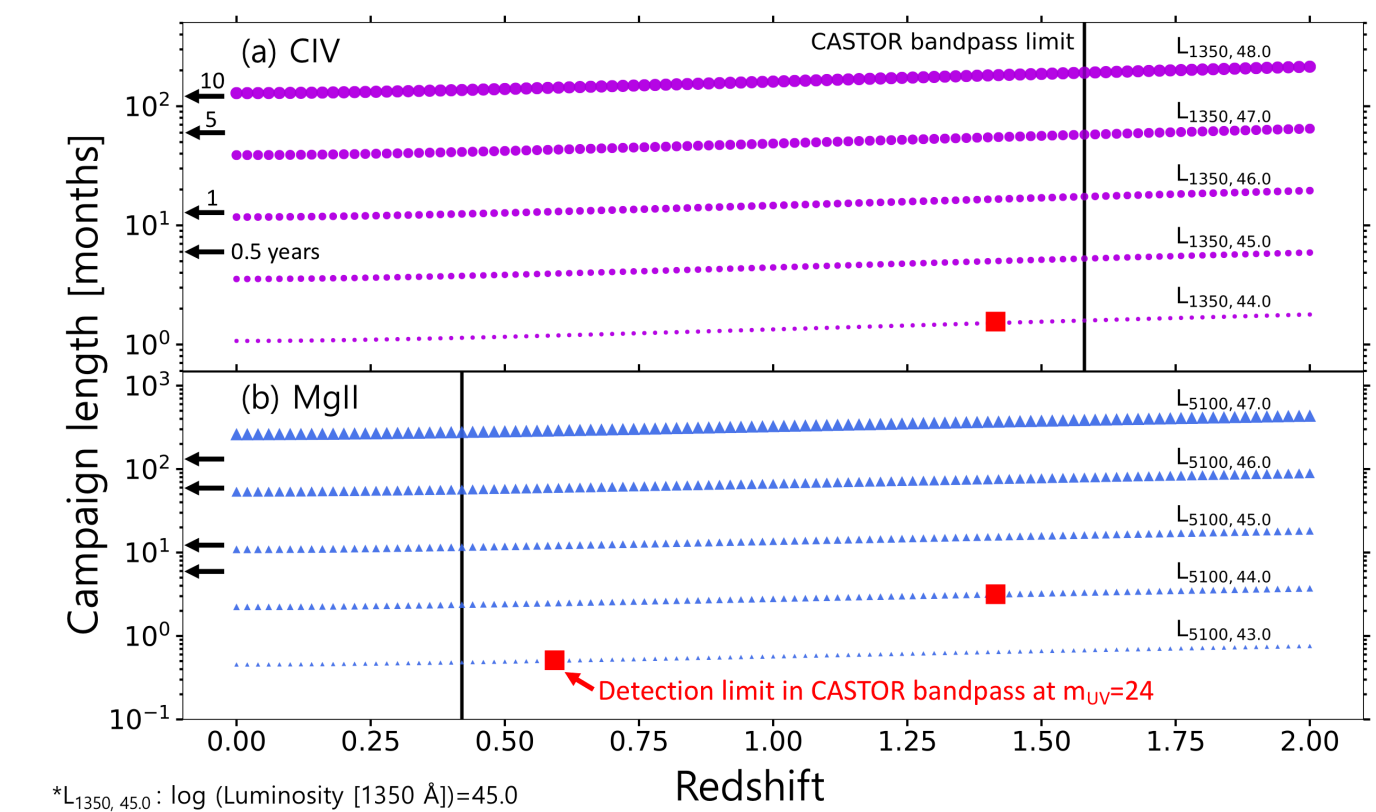


Fig. 4
(Credit: Viraja Khatu)

High-luminosity AGN need **longer cadences** than those at lower luminosities.

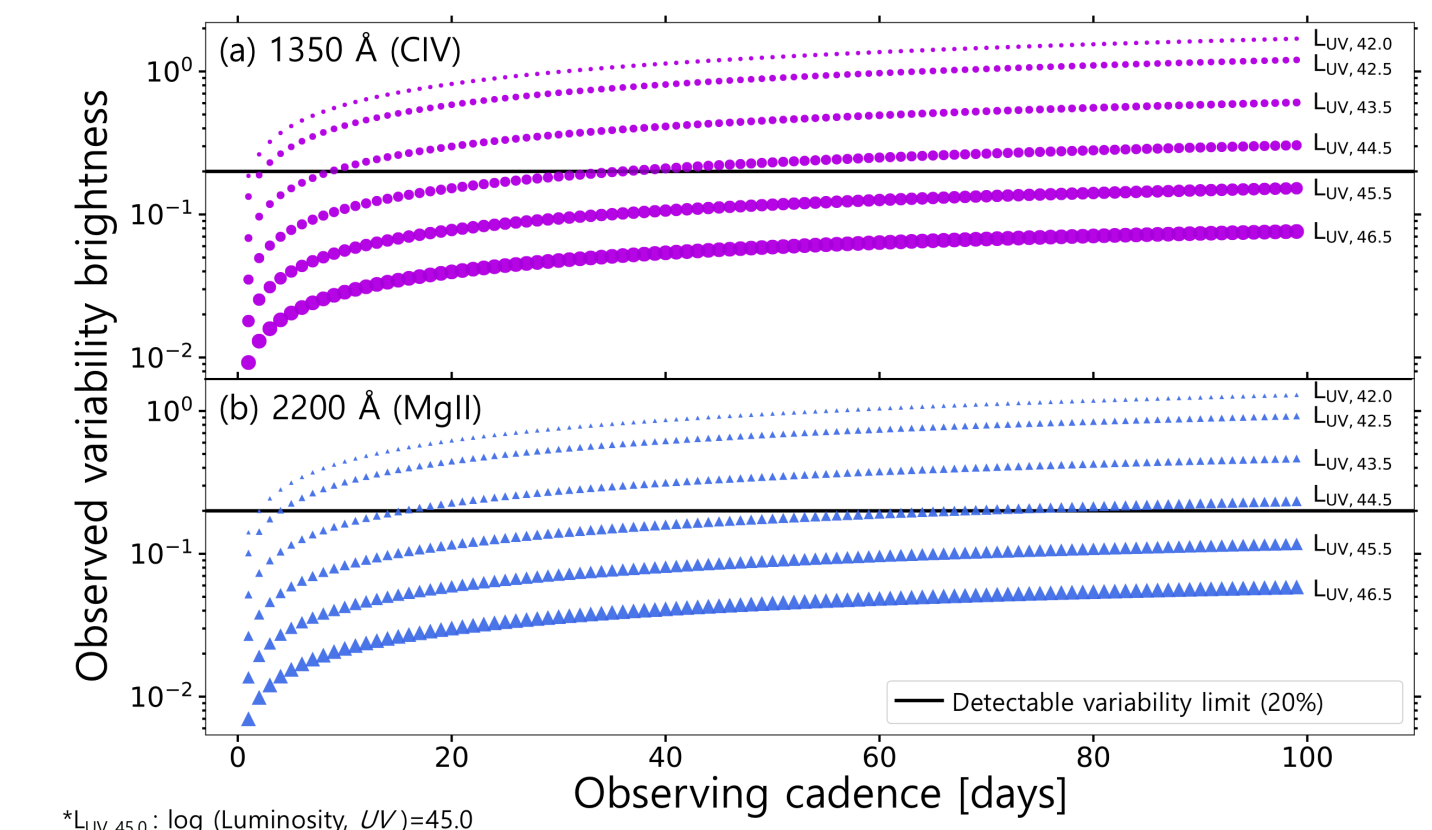


Fig. 5
(Credit: Viraja Khatu)

ACKNOWLEDGEMENTS

We thank Dr. Girish Kulkarni for his recommendations on this project.



CASTOR* AGN Reverberation Mapping Goal :: Measure black holes masses for **1000+ AGN** (* Cosmological Advanced Survey Telescope for Optical and ultraviolet Research)

Design :: **Generic** (current capability: CASTOR; adaptable for other facilities, both space- and ground-based)

Programming language :: **Python**