

# Gautham Narayan

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## RESEARCH INTERESTS

- Observational Cosmology and Cosmography
- Time-domain Astrophysics, particularly Transient Phenomena
- Wide-field Ultraviolet, Optical and Infrared Surveys
- Multi-messenger Astrophysics & Rapid Follow-up Studies
- Statistics, Data Science and Machine Learning

## PROFESSIONAL APPOINTMENTS

Current:	Assistant Professor, University of Illinois at Urbana-Champaign Aug 2019–present
Previous:	Lasker Data Science Fellow, Space Telescope Science Institute Jun 2017–Aug 2019
	Postdoctoral Fellow, National Optical Astronomy Observatory (now NOIRLab) Jul 2013–Jun 2017 <sup>1</sup>

## EDUCATION

Harvard University	Ph.D. Physics, May 2013 Thesis: “ <a href="#">Light Curves of Type Ia Supernovae and Cosmological Constraints from the ESSENCE Survey</a> ” Adviser: Prof. Christopher W. Stubbs A.M. Physics, May 2007
Illinois Wesleyan University	B.S. (Hons) Physics, Summa Cum Laude, May 2005 Thesis: “ <a href="#">Photometry of Outer-belt Objects</a> ” Adviser: Prof. Linda M. French

## GRANTS DURING TENURE AT ILLINOIS

- PI, NSF CSSI, USD 3,554,724, Aug 2023–present
- PI, NSF CAREER, USD 717,600, Aug 2023–present
- PI, NSF AAG, USD 328,618, Aug 2022–present
- PI, HST GO 16764, USD 274,723, Aug 2022–present
- PI, LSST-Wasabi Enabling Science Award, USD 25,000, Aug 2022–present
- PI, LSST Enabling Science Awards for undergraduates at UIUC, USD 10,000, Fall 2021
- PI, NASA ADAP, USD 334,711, 2020–2
- PI, LSST Enabling Science Award, USD 27,000, 2020–2
- Co-I, US DoE High Energy Theory & Cosmology, USD 50,000, Apr 2023–present
- Co-I, HST GO 17128 USD 82,030, Oct 2022–present
- Co-I, NCSA Internal Award, “ANTARES at NCSA”, USD 88,683, 2020–2
- Co-I on three *James Webb Space Telescope* GO Cycle 1 programs
- Co-I on two NASA ADAP proposals, USD 66,835 to UIUC (PIs. D. Jones, A. Rest) 2021–present

<sup>1</sup>Formally employed by The University of Arizona CS Dept. from Dec 2014–Apr 2016, but located at NOAO

- Co-I, grant for developing ANTARES, Heising-Simons Foundation, USD 567,000, 2018–21

## AWARDS

- Lincoln Excellence for Assistant Professors, 2023
- Selected for the 1<sup>st</sup> cohort of the [Illinois Academic Leadership and Management Institute](#)
- List of Instructors rated Excellent, Spring 2023
- List of Instructors rated Outstanding, Spring 2020
- 2<sup>nd</sup> ever recipient of the Barry M. Lasker Data Science Fellowship, STScI, 2017–9
- Best-in-Show, Art of Planetary Science, Lunar and Planetary Laboratory, U. Arizona, 2015

## RESEARCH HISTORY AND SELECTED PUBLICATIONS

Below are brief descriptions of my work on key topics, together with a related publication.

### Cosmology and the Nature of Dark Energy

- **Analysis Coordinator**, LSST Dark Energy Science Collaboration (DESC), previously Deputy Analysis Coordinator (2021–2023) and Supernova Working Group Convener (2019–2021).
- Led analysis using ESSENCE and literature SNIa to derive cosmological constraints on dark energy equation of state  $w$ ; co-authored analysis on PS1 SNIa Foundation photometric SNIa
- Co-developed BayeSN with K. Mandel — probabilistic model to infer distance moduli, light curve, and dust properties from UV+Optical+NIR data of low- $z$  SNIa; currently evolving into model for SNIa SED inference at cosmological distances for *NGRST*, future surveys
- Leading analysis apply BayeSN-SED to combined Foundation, Pan-STARRS & literature samples — will be the largest dataset of confirmed cosmological SNIa

**Narayan et al.**, ‘16, “Light Curves of 213 Type Ia Supernovae from the ESSENCE Survey”, *ApJS*

### Understanding the Physics of Rare and Unusual Transients

- Led or made major contributions to several projects studying unusual SN, including SN 2020oi, SN 2018oh, SN 2009ku, SN 2008ha, as well as open-source tools to model such events
- Combining work on machine learning with interest in rare & unusual transients by developing novel methods for anomaly detection, incorporating gravitational wave, neutrino and high-energy gamma ray signals into alert-brokers.

**Narayan et al.**, ‘11, “Displaying the Heterogeneity of the SN 2002cx-like Subclass of Type Ia Supernovae with Observations of the Pan-STARRS-I Discovered SN 2009ku”, *ApJL*

### Machine Learning for Time-Domain Discovery

- Lead developer of deep-learning, traditional ML and active learning algorithms for time-series classification on state-of-the-art alert broker system: [ANTARES](#) operating on Zwicky Transient Facility (ZTF) alerts as test bed for Legacy Survey of Space and Time (LSST)
- Lead for [Extended LSST Astronomical Time-Series Classification Challenge \(ELAsTiCC\)](#). (v1) remains the largest simulation of the entire time-domain sky for statistical studies, and the largest Kaggle challenge in Astronomy.

**Narayan et al.**, ‘18, “Machine-learning-based Brokers for Real-time Classification of the LSST Alert Stream”, *ApJS Special Issue “Data: Insights and Challenges in a Time of Abundance”*

### Operations, Calibration, Infrastructure & Optimization of Wide-field Surveys

- PI of SCiMMA Team, developing real-time system to coordinate LIGO, high-energy particle and neutrino, ground- and space-based facilities

- Extensive involvement in transient pipeline development & validation several current and past astrophysical surveys
- Lead analysis to use *Hubble* imaging and large-aperture spectroscopy to establish faint spectrophotometric standards for LSST and future surveys

**Narayan et al.**, '19, "Sub-percent Photometry: Faint DA WD Spectrophotometric Standards for Astrophysical Observatories", *ApJS*

## PROFESSIONAL AFFILIATIONS

I am an active member of several groups and projects, completed and on-going:

- |  |                                      |
|--|--------------------------------------|
| The LSST Dark Energy Science Collaboration (DESC)          | The [P/E]LAsTiCC Team                |
| The SCiMMA Team  | The Young Supernova Experiment (YSE) |
| The ANTARES Project  | The DECam Alliance for Transients    |
| The Gravity Wave Collective                                | The <i>HST</i> SIRAH & Dust Survey   |
| The <i>Kepler</i> & <i>TESS</i> Extra Galactic Survey      | The DA White Dwarf Calibration Team  |
| The Mosaic z-band Legacy Survey (MzLS)                     | The SN Lightechoes Team              |
| The LSST Transient & Variable Stars Collaboration (TVS)    | The Foundation Supernova Survey      |
| The Pan-STARRS PS1 Science Collaboration                   | The ESSENCE Collaboration            |
| Member of the American Astronomical Society (2007–present) |                                      |

## OBSERVING EXPERIENCE

I am an observational cosmologist with extensive experience with different facilities:

- PI, *HST* GO-16764, (34 orbits)
- PI, Gemini N (2020A-Q-115, 2021B-Q-310), Gemini S (2021B-Q-317), programs continue but now led by my students
- Co-PI, Young Supernova Experiment, ~15% of total time on Pan-STARRS PS1 & PS2, 2020–2024
- Co-PI on NOIRLab Young Supernova Program on DECam with Long-term Status (LTS) for 2 years (30 nights)
- Co-I on several major *JWST* ToO programs and *HST* programs with *WFC3*, *ACS* and *STIS* including: GO-12967 (18 orbits), 12999 (8 orbits), 13046 (100 orbits), 13711 (60 orbits), 14216 (100 orbits), 14244 (8 orbits) and 15113 (54 orbits), 17128 (105 orbits)
- PI and Co-I on numerous accepted NOIRLab, Las Cumbres Observatory, ESO and *Swift* observing proposals
- MMT Observatory: 15 nights of Blue Channel spectroscopy on site, 2 nights of remote observing
- Magellan Observatory: 7 nights LDSS3 imaging and long-slit spectroscopy  
1 night of IMACS long-slit spectroscopy
- Gemini Observatory: Analysis of GMOS spectroscopy from several nights of queue observing
- Kitt Peak National Observatory: several nights of imaging on the 4 m with MOSAIC 1.1 & 3
- Cerro-Tololo Inter-American Observatory: several nights with 0.9 m & 4 m with DECam  
Analysis of 197 nights of MOSAIC-II imaging for ESSENCE/SuperMacho
- WIYN Observatory: 3 nights of imaging on the WIYN 3.5 m with ODI
- F. L. Whipple Observatory: several nights of long-slit spectroscopy on the 1.5 m with FAST and imaging on the 1.2 m with Keplercam, both on-site and remote
- Las Cumbres Observatory: Analysis of 120 hours of 1 m SINISTRO imaging

## MENTORING AND TEACHING

### Graduate Students

**Aadya Agrawal** (UIUC Astro), Adviser, Aug. 2023–present

- Working with Narayan and Dr. Justin Pierel on strongly lensed SNIa
- Leading analysis of lens model consistency paper with SN Hope
- Co-author on one paper on SN Hope (Pierel et al. '24)
- Working on *JWST* data analysis, *HST* supernovae programs

**Tanner Murphy** (UIUC Astro), Adviser, Aug. 2023–present, Research Collaborator, Aug. 2020–May 2021

- Working with Narayan on YSE DECam data
- Previous Masters at SUNY Stonybrook working with Prof. Will Farr on transients
- Published Murphy, Fields, Hogan and Narayan, MNRAS 2021 as an undergraduate at UIUC
- Advised by Prof. Brian Fields and worked with Narayan to study distribution of SNe within our Galaxy

**Haille Perkins** (UIUC Astro), Adviser, 2023–present

- Working with Narayan on adding AGN afterglow model to KNe
- Assessing detectability of KNe with Rubin and *UVEX*
- Developing model for hierarchical inference of KNe population parameters
- Led paper with Prof. Brian Fields on determining lethality of nearby KNe

**Aidan Berres** (UIUC), Adviser, 2022–2023

- Working with Narayan on adding *HST/STIS* Data (GO-16764, PI Narayan) to DA White Dwarfs
- Worked with Narayan and Prof. Ryan Foley on *HST* SNIa Dust Program (GO-17128, PI Foley)
- Developed methods to automatically find *HST* targets using ANTARES, Transient Name Server

**Amanda Wasserman** (UIUC), Adviser, 2021–present

- Won DOE SCGSR Award to work on RESSPECT at LBNL in Spring 2024
- Working on developing RESSPECT active learning and real-time followup for LSST
- Member of LSST DESC & LSST commissioning team, and member of YSE and DECAT teams
- Working on spectroscopy of YSE SNIa, PI of Gemini N & S programs begun by Narayan

**Patrick Aleo** (UIUC), Adviser, 2020–present

- Defended Ph.D., March 2024, began work at US National Security Campus, Kansas City
- Winner of Illinois Survey Science Fellowship (2020, 2021) and the Chu Award, 2023
- Working on anomaly detection for transients within ZTF and YSE
- Led 1<sup>st</sup> data-release of YSE, combining data from three telescopes, using novel ML classification
- Planning on graduating May 2024

**Alex Gagliano** (UIUC), Adviser, 2019–2023

- Defended Ph.D., April 2023, began as NSF IAIFI Fellow between MIT/Harvard, Fall 2023
- Winner of American Statistical Association Astrophysics Interest Group Paper of the Year, 2021

- Winner of the Simons Fellowship CCA (2021), NSF GRF (2020) and Illinois Survey Science Fellowship (2019)
- Worked on correlations between supernovae and their hosts [15, GHOST], SN 2020oi [11], LSST PLAsTiCC and other projects.

**Daniel Muthukrishna** (U. Cambridge), Co-Adviser, 2017–2021

- Now staff at MIT, working on *TESS* with Prof. George Ricker, Fall 2021
- Research with Narayan on deep learning for transient classification (RAPID, Muthukrishna et al., 2019)
- Muthukrishna is member of LSST PLAsTiCC team and the ANTARES project

### Other Mentorship of Graduate Students

- Working closely with Ben Boyd (Cambridge, w/ Prof. Kaisey Mandel) and previously with Dr. Qinan Wang (JHU) and Dr. Stephen Thorp (Stockholm)
- Served/serving on the prelim/thesis committee for Alejandro Cardenas-Avendano, Scott Perkins, Yiqi Xie (UIUC Physics), Colin Burke, Nicholas Earl, Chris Tandoi (Chair), Sunny Tang, Maggie Verrico, David Vizgan, Qiaoya Wu (UIUC Astro), Ana Sagues Carracedo (Oskar Klein Center, Stockholm University, Sweden) and Malema Hendrick Ramonyai (University of the Western Cape, S. Africa)
- 2021 summer research advisor for NCSA NRT Summer students Laura Salo (also co-author on ELAsTiCC papers) and Sai Sharan Sundar (together with Eliu Huerta) both from U. Minnesota
- Mentorship of grad students from the U. Arizona Computer Science Dept. on ANTARES, particularly Zhe Wang and Shuo Yang (2015–7)

### Undergraduate Students

**Ved Shah** (UIUC CS), Adviser, Jan. 2021–present

- Graduated May 2024, won dept. Wyatt award, beginning Ph.D. at Northwestern, Fall 2024
- Finishing hierarchical real-time classification model for LSST ELAsTiCC
- Led kilonova rate analysis using Bayesian Inference Framework (Shah et al., '24 MNRAS)
- Developed M-dwarf flare model with Narayan and postdoc Malanchev; being integrated into PLAsTiCC
- NCSA Summer 2021 Intern; funded by LSST Enabling Science Program (PI Narayan)
- Used ML to distinguish M-dwarf flares from rapid transients

**Jason Vazquez** (UIUC CS+Astro), Adviser, Feb. 2021–present

- Graduated, May 2023, beginning Ph.D. at UW Milwaukee, Fall 2024
- Finished YSE type IIp sample with Narayan and Kilpatrick
- First-authored paper on SN2019mhm with Kilpatrick and Wong
- Worked on SN2021blg and 2022 YSE supernovae with other survey members
- 2021 Summer REU at Northwestern University with Prof. Wen-fai Fong & C.D. Kilpatrick

**Qifeng Cheng** (UIUC Astro), Adviser, Feb. 2021–present

- Graduated May 2023, won dept. Wyatt award, beginning PhD in Astronomy at Duke University in Fall 2023

- Developed new dwarf nova and changing-look AGN model with Narayan and postdocs Soraisam & Malanchev
- Northwestern REU with Patrick Sheehan, Summer 2021, funded by LSST Enabling Science Program (PI Narayan)
- Earned honors with Narayan for work in ASTR 210 by developing viz. of analema for exoplanetary systems

**Sammy Sharief** (UIUC CS+Astro), Adviser, Feb. 2021–present

- Began PhD in Computer Science at U. Montreal in Fall 2023
- Graduated May 2023, completed senior thesis on work at TAURUS program with Stella Offner (UIUC adviser, Narayan)
- Third author on YSE DR1 with Narayan and Patrick Aleo, and implemented YSE DECam pipeline
- Adapted method to retrieve ZTF forced photometry from IPAC & modeling SNe
- REU on Multi-messenger Astrophysics at RIT, Summer 2021 and at TAURUS program, UT Austin, Summer 2022

**Filip Matasic** (UIUC CS+Astro), Adviser, Sep. 2021–May 2022

- Graduated May 2022, completed a senior honors thesis with Narayan, now working in InfoSec
- Worked with Aleo on YSE 1st data release
- Analyzed properties of YSE and ZTF observations to generate simulations for ML models

**Andrew Engel** (UIUC Physics), Adviser, 2019–present

- Beginning Ph.D. at The Ohio State University as Dean's Fellow, Fall 2024
- Graduated May 2020 – went on to position as Sr. data scientist at PNNL
- Working on machine learning for photometric redshifts from galaxies – awarded NASA ADAP for photo-z work, and continuing to work with Narayan & Eileen Beyer
- Algorithm developed being used in both ANTARES and YSE - completing paper on research with Narayan in 2023

**Daniel Alcantara** (Bard College), Research Collaborator, 2016–9

- Intern with R. Street at Las Cumbres Observatory working on microlensing detection
- Worked with Narayan to dramatically improve performance of prototype classifier
- Published Alcantara, Bachelet, Narayan and Street, 2019
- Algorithm being used with MARS broker to find microlensing candidates with ZTF

**Tayeb Zaidi** (Macalester College), Honors Thesis Adviser, 2016–7

- Now in PhD Program for Biophysics at Northwestern University, working on MRI devices
- Worked with Narayan on ANTARES as summer REU student at NOAO in 2015
- Continued work on time-series classification for Senior Honors (earned April 2017)
- Published Narayan, Zaidi, Soraisam et al., 2018, adapted for LSST PLAsTiCC

### Co-mentorship of Other Undergraduate Students

- Mai Li (UIUC Astronomy, '26) - working on DA white dwarf data with *HST/STIS*
- Holly Wingren (UIUC Astronomy, '24) - jointly with Prof. Brian Fields and Alex Gagliano. REU

at Fermilab & UIUC Statistics, won Layla Ryan Memorial Award from UIUC Astronomy, starting Masters in Education

- Athish Thiruvengadam (UIUC CS+Astronomy, '24) - jointly with Prof. Eliu Huerta
- Kunal Bhatia (UIUC Astronomy, '21) - jointly with Dr. Monika Soraisam. Was admitted to Astronomy PhD at Imperial College, London, but ultimately decided to pursue opportunities in industry.

### Previous REU Students

- Henna Abunemeh (UIUC IDEAS, 2023) graduated May 2024 from UI Chicago, and is beginning her Ph.D. at UIUC, Fall 2024, having completed work on a DOE SULI REU at Argonne National Lab with Dr. Lindsey Bleem
- Marcus Lee (NOAO, 2014) was the first indigenous (Tohono O'odham) student to complete REU program at NOAO
- Linoy Kotler (STScI, 2018) worked on wavelet-based classification of Foundation photometric SNIa sample and is now at Rice University

### Postdoctoral Scientists Mentored

#### Konstantin Malanchev (UIUC), 2020–2023

- Now LINCC Research Scientist at Carnegie-Mellon University, Summer 2023–present
- Worked with Narayan and Patrick Aleo on anomaly detection, YSE DR1, developing feature extraction & ELAsTiCC
- Developing large cross-matched, cross-calibrated photometric database for LSST
- Worked with undergrad Qifeng Cheng on changing-look AGN model

#### Deep Chatterjee (UIUC), 2020–2022

- Second recipient of Illinois Survey Science Postdoctoral Fellowship
- Worked with Narayan on ANTARES on kilonovae detection and integration with SCiMMA
- Worked on using deep-learning for rapid approximation of neutron star EoS and identification of electromagnetic counterpart (El-Cid)
- Advised undergrad Ved Shah Gautam along with Narayan on estimating KN rates
- Now Alerts and Real-time Inference Lead at MIT LIGO Lab

#### Monika Soraisam (UIUC), 2019–2021

- First recipient of Illinois Survey Science Postdoctoral Fellowship
- Working with Narayan on ANTARES (since 2016), YSE and studies of interesting time-domain phenomena
- PI of NCSA CDDR grant to deploy ANTARES broker system on Radiant (Co-I Narayan)
- Worked with undergrads Qifeng Cheng on dwarf nova model, and Kunal Bhatia on ZTF Transient Detection
- Now Research Staff at Gemini Observatory

ASTR 350, The Big Bang, Black Holes, and the End of the Universe, Fall 2023  
ASTR 310, Computing in Astronomy, UIUC, Fall 2021, Spring 2022, Fall 2022  
ASTR 210, Introduction to Astrophysics, UIUC, Fall 2020  
ASTR 596, Fundamentals of Data Science, UIUC, Spring 2020, Spring 2023  
ZTF Summer School, Pasadena, Aug. 2018  
**Instructor** for: LSST Data Science Fellowship Program, [Session 5](#), Baltimore, Jan. 2018  
LSST Data Science Fellowship Program, [Session 3](#), Tucson, Apr. 2017  
NOAO Teen Astronomy Cafe, "[How Stars Die](#)", Tucson, Nov. 2017  
NOAO Big Data Workshop for Tucson High School Students, Tucson, Jan. 2017  
Python Workshop for NOAO/NSO REU Students, Tucson, Summer 2014 & 2015

I've additionally served as a Teaching Assistant at Harvard, as Teaching Assistant, Lab Assistant and Tutor at Illinois Wesleyan, and as guest lecturer for Astro 102 (Instructors: C. Salyk and K. Garmany) at the Tohono O'odham Community College.



**INVITED COLLOQUIA/SEMINARS/CONFERENCES, 2018–PRESENT**

Invited Speaker, Gravitational Wave Physics and Astronomy Workshop, Birmingham, UK, May 2024  
 Invited Speaker, Hot Wiring the Transient Universe VII, University of Toronto, Canada, May 2024  
 Invited Speaker, Time-Domain Needles in Rubin's Haystacks, Harvard University, Apr. 2024  
 Invited Speaker, LSST Information and Statistics Science Collaboration, Harvard University, Apr. 2024  
 Special Seminar, DARK, Copenhagen, Denmark, Feb. 2024  
 Invited Speaker, What Was That? ESO in the Era of LSST, Garching, Germany, Jan. 2024  
 Invited Speaker, Cosmic streams in the era of Rubin, Puerto Varras, Chile, Dec. 2023  
 University of Pennsylvania, Dept. of Physics and Astronomy, Colloquium, Oct. 2023  
 Invited Speaker, Windows on the Universe, Tucson, Oct. 2023  
 Indiana University, Dept. of Astronomy, Colloquium, Sep. 2023  
 Invited Speaker, LSST Project and Community Workshop, Aug. 2023  
 Invited Speaker, SuperNova EXplosions: Theory and Observations, Technion, Israel, Aug. 2023  
 Invited Speaker, MARS Lecture Series, Pacific Northwest National Labs, May 2023  
 Invited Speaker, Multi-wavelength follow-up of Fast Radio Bursts, Toronto, Apr. 2023  
 Session Chair, Supporting Computational Science with Rubin LSST, Virtual, Mar. 2023  
 Panelist, The Future of Astrophysical Data Infrastructure, New York, Feb. 2023  
 Speaker, Panelist, Session Chair, AAS 241, Seattle, Jan. 2023  
 Dark Energy Science Collaboration, Plenary Talk, University of Chicago, Jul. 2022  
 Speaker, Bayesian Deep Learning for Cosmology and Time Domain Astrophysics, Paris, Jun 2022  
 Pennsylvania State University, LSST Workshop, May. 2022  
 LSST European Broker Coordination Seminar, Apr. 2022  
 SCiMMA Public Telecon, "[A Data Lake for Multi-messenger Astrophysics](#)", Oct. 2021  
 Pennsylvania State University, Dept. of Astronomy and Astrophysics Colloquium, Mar. 2022  
 Invited Speaker, Cherenkov Telescope Array Project, Jun 2021  
 Invited Speaker, AAS 238, Meeting-in a-meeting (MiM) on Machine Learning, Jun 2021  
 LSST Photometric Calibration Working Group Workshop, May 2021  
 LSST Broker Workshop, Apr 2021  
 DESI Time-domain Meeting, Apr 2021  
 LSST DESC Virtual Meeting - Jul 2020  
 SciMMA Virtual Meeting, May 2020  
 Plenary, Kentucky Area Astronomy Annual Meeting - Louisville, KY, Mar 2020  
 LSST DESC Annual Meeting - Tucson, AZ, Jan 2020  
 Kavli Visitor, University of Cambridge, Institute of Astronomy, Dec 2019  
 Speaker, Session Chair, LSST TVS and SMWLTV workshop - Newark, DE, Oct 2019  
 Speaker, SNIa Cosmology Analysis Meeting - KICP Chicago, IL, Oct 2019  
 Invited Speaker, Inference for Multi-messenger Astrophysics - Berkeley, CA, May 2019  
 Invited Speaker, University of Delaware, Astronomy Seminar - Newark, DE, May 2019  
 Invited Speaker, University of Illinois, LSST Seminar - Urbana-Champaign, IL, Apr. 2019  
 Iowa State University, Dept. of Physics & Astronomy Colloquium - Ames, IA, Apr. 2019  
 Louisiana State University, Dept. of Physics & Astronomy Colloquium - Baton Rouge, LA, Mar. 2019  
 University of Wisconsin, Dept. of Physics Colloquium - Milwaukee, WI, Mar. 2019  
 University of Alabama, Dept. of Physics & Astronomy Colloquium - Tuscaloosa, AL, Mar. 2019  
 Michigan Technological University, Dept. of Physics Colloquium - Houghton, MI, Feb. 2019  
 University of Illinois, Dept. of Astronomy Colloquium - Urbana-Champaign, Feb. 2019

## SERVICE & PUBLIC OUTREACH WORK

### Service to Scientific Collaborations

Analysis Coordinator, LSST Dark Energy Science Collaboration, 2023–present  
 Deputy Analysis Coordinator, LSST Dark Energy Science Collaboration, 2021–2023  
 Executive Committee, Young Supernova Experiment, 2020–present  
 Member, SN Science Investigation Team, Nancy Grace Roman Space Telescope, 2020–present  
 Organizer, LSST DESC Hack Week at UIUC, Summer 2022  
 Co-convenor, LSST DESC Supernova Working Group, 2019–2021

### Service to the UIUC Astronomy Department

Deputy Director, UIUC/NCSA Center for Astrophysical Surveys, Spring 2021–present  
 Senator, UIUC Faculty Senate, Fall 2022–present  
 UIUC AURA Member Representative, 2021–present  
 Colloquium Chair, UIUC Astronomy, AY 2020, Spring 2023  
 Member, Faculty Search Committee, UIUC Astronomy, 2020, 2021 & 2023  
 Reader, Graduate Admissions Committee, UIUC Astronomy, 2023, 2024  
 Representative, UIUC Astronomy X Data Science Program, 2022–present  
 Member, UIUC Astronomy Curriculum Committee, AY 2021–present  
 Member, UIUC Astronomy Computing Committee, AY 2022–present  
 Member, UIUC Astronomy EDI Committee, 2020–2023

### Meetings and Talk Series

SOC, [Unveiling the Dynamic Universe: Cosmic Streams in the Era of Rubin](#), Puerto Varas, Chile, Dec. 2023  
 SOC & LOC, [The Transient and Variable Universe](#), UIUC, July 2023  
 Chair, [Boom! A Workshop on LSST Transients](#), UIUC, July 25–9, 2022  
 SOC, [COSMO-2021 meeting](#), Virtual, Aug 2–6, 2021  
 SOC, Managing Follow-up Observations in the Era of ZTF and LSST, NSF’s NOIRLab, Sep. 30–Oct. 4, 2019  
 Chair, [Enabling Multi Messenger Astrophysics in the Big Data Era](#), STScI, Apr. 25–26, 2019  
 SOC, [Deep Learning for Multimessenger Astrophysics: Real-time Discovery at Scale](#), Oct. 2018  
 LOC, Building the Infrastructure for Time-Domain Alert Science in the LSST Era, May 2017  
 Organizer, NOAO FLASH Talk Series, 2015–2017  
 Organizer, NOAO Coffee Hour Series, 2014–5

### Service to the Community

Panelist, NASA Review Panel, Jan-Jun 2022 & Jan-Jun 2024  
 Panelist, NSF Review Panel, Mar 2020  
 Editorial Board, Astronomy and Computing, to begin Fall 2023  
 Reviewer for the AAS Journals, MNRAS, ongoing

## Public Outreach

Invited Talk and Stargazing, Dark Sky Series, Middle Fork River Forest Preserve, July 2024  
 Invited Talk, St. Louis Astronomical Society, Washington University, St. Louis, May 2024  
 Illinois Solar Eclipse, Apr. 2024  
 Invited Talk, Stargazing and S'mores, Allerton Park & Retreat Center, Sep. 2023  
 Invited Talk, UIAS Open Night, May 2023  
 Invited Talk, Illinois Dark Skies Star Party, Sangamon Astronomical Society, Oct 2022  
 Stargazing, Family Night Campout, Allerton Park & Retreat Center, Oct 2022  
 Invited Talk, University of Illinois Astronomical Society, Sep 2022  
 Kaler Lecture, Starkel Planetarium - Champaign, IL, Oct 2020  
 Speaker, Astronomy on Tap - Urbana-Champaign, "The Myth and Mythology of the Planets", Feb 2020  
 Organizer, Astronomy on Tap - Urbana-Champaign, Nov 2019–Aug 2022  
 Speaker, Astronomy on Tap - Urbana-Champaign, "Making a Movie of the Night Sky", Sep. 2019  
 Organizer, Astronomy on Tap - Tucson/Space Drafts, 2015-2017  
 Speaker, Space Telescope Public Lecture Series, [Chasing Supernovae with Kepler](#), Sep. 2018  
 Guest, Three Body Problems Podcast, [Bringing Data Science Into Astronomy](#), Sept. 2018  
 Scientist, TED-Ed Original Videos ([Pt. 1](#)) ([Pt. 2](#))  
 Speaker, 365 Days of Astronomy Podcast ([Pt. 1](#)) ([Pt. 2](#))  
 Speaker, Youth for Astronomy and Engineering, Nov. 2018  
 Speaker, NerdNite Baltimore, Mar. 2018  
 Panelist, Tucson Comic Con and TUSCon, Nov. 2015 and 2016  
     ["Robots in Space"](#) and ["The Physics of Space Battles"](#)  
 Speaker, Astronomy on Tap - Tucson with the Tucson Symphony Orchestra, Oct. 2016  
     ["A Trip through Gustav Holst's Planets"](#)  
 Speaker, Astronomy on Tap - Tucson, Jan. 2015  
     ["If You Only Knew The Power of The Dark Side"](#)  
 Speaker, Green Valley Astronomy Club, Sahuarita, AZ, May 2016  
 Volunteer, Science Night, Elvira Elementary School, Tucson, AZ, Mar. 2015 and Mar. 2017  
 Volunteer, Astronomy Night, Arizona Sonoran Desert Museum, Jul. 2015  
 Volunteer, Kitt Peak National Observatory Open Night for the Tohono O'odham Nation, May 2015  
 Volunteer, Tucson Festival of Books, Mar. 2015

I've led public stargazing at the Museum of Science in Boston (2011–2), the Table Mountain star party, WA (2006) and throughout my time as an undergraduate at Illinois Wesleyan's Mark Evans Observatory (2001–5).

## REFERENCES

- Prof. Christopher Stubbs      Dean of Science, Harvard University  
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- Prof. Renée Hložek      Dept. of Astronomy & Astrophysics, University of Toronto  
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## LIST OF PUBLICATIONS

h-index: 40, 7430 citations. (Scopus/Google Scholar)

Publications are listed with 1<sup>st</sup> author or major contributor first.

### Primary Publications

- [1] **Anomaly Detection and Approximate Similarity Searches of Transients in Real-time Data Streams.** P. D. Aleo, A. W. Engel, **G. Narayan**, C. R. Angus, K. Malanchev, K. Auchettl, V. F. Baldassare, A. Berres, T. J. L. de Boer, B. M. Boyd, K. C. Chambers, K. W. Davis, N. Esquivel, D. Farias, R. J. Foley, A. Gagliano, C. Gall, H. Gao, S. Gomez, M. Grayling, C. C. Lin, E. A. Magnier, K. S. Mandel, T. Matheson, S. I. Raimundo, V. G. Shah, M. D. Soraisam, K. M. de Soto, S. Vicencio, and V. A. Villar. *arXiv e-prints*, Apr. 2024. arXiv:2404.01235.
- [2] **Neural Post-Einsteinian Framework for Efficient Theory-Agnostic Tests of General Relativity with Gravitational Waves.** Y. Xie, D. Chatterjee, **G. Narayan**, and N. Yunes. *arXiv e-prints*, Mar. 2024. arXiv:2403.18936.
- [3] **Preliminary Report on Mantis Shrimp: a Multi-Survey Computer Vision Photometric Redshift Model.** A. Engel, **G. Narayan**, and N. Byler. *arXiv e-prints*, Feb. 2024. arXiv:2402.03535.
- [4] **Predictions for electromagnetic counterparts to Neutron Star mergers discovered during LIGO-Virgo-KAGRA observing runs 4 and 5.** V. G. Shah, **G. Narayan**, H. M. L. Perkins, R. J. Foley, D. Chatterjee, B. Cousins, and P. Macias. *Mon. Not. R. Astron. Soc.*, Feb. 2024. 528(2):pp. 1109–1124.
- [5] **Relative Intrinsic Scatter in Hierarchical Type Ia Supernova Sibling Analyses: Application to SNe 2021hpr, 1997bq, and 2008fv in NGC 3147.** S. M. Ward, S. Thorp, K. S. Mandel, S. Dhawan, D. O. Jones, K. Taggart, R. J. Foley, **G. Narayan**, K. C. Chambers, D. A. Coulter, K. W. Davis, T. de Boer, K. de Soto, N. Earl, A. Gagliano, H. Gao, J. Hjorth, M. E. Huber, L. Izzo, D. Langeroodi, E. A. Magnier, P. McGill, A. Rest, C. Rojas-Bravo, R. Wojtak, and Young Supernova Experiment. *Astrophys. J.*, Oct. 2023. 956(2):111.
- [6] **Results of the Photometric LSST Astronomical Time-series Classification Challenge (PLAsTiCC).** R. Hložek, A. I. Malz, K. A. Ponder, M. Dai, **G. Narayan**, E. E. O. Ishida, J. Allam, T., A. Bahmanyar, X. Bi, R. Biswas, K. Boone, S. Chen, N. Du, A. Erdem, L. Galbany, A. Garreta, S. W. Jha, D. O. Jones, R. Kessler, M. Lin, J. Liu, M. Lochner, A. A. Mahabal, K. S. Mandel, P. Margolis, J. R. Martínez-Galarza, J. D. McEwen, D. Muthukrishna, Y. Nakatsuka, T. Noumi, T. Oya, H. V. Peiris, C. M. Peters, J. F. Puget, C. N. Setzer, Siddhartha, S. Stefanov, T. Xie, L. Yan, K. H. Yeh, and W. Zuo. *Astrophys. J. Suppl. Ser.*, Aug. 2023. 267(2):25.
- [7] **The simulated catalogue of optical transients and correlated hosts (SCOTCH).** M. Lokken, A. Gagliano, **G. Narayan**, R. Hložek, R. Kessler, J. F. Crenshaw, L. Salo, C. S. Alves, D. Chatterjee, M. Vincenzi, A. I. Malz, and LSST Dark Energy Science Collaboration. *Mon. Not. R. Astron. Soc.*, Apr. 2023. 520(2):pp. 2887–2912.
- [8] **The Young Supernova Experiment Data Release I (YSE DRI): Light Curves and Photometric Classification of 1975 Supernovae.** P. D. Aleo, K. Malanchev, S. Sharief, D. O. Jones, **G. Narayan**, R. J. Foley, V. A. Villar, C. R. Angus, V. F. Baldassare, M. J. Bustamante-Rosell, D. Chatterjee, C. Cold, D. A. Coulter, K. W. Davis, S. Dhawan, M. R. Drout, A. Engel, K. D. French, A. Gagliano, C. Gall, J. Hjorth, M. E. Huber, W. V. Jacobson-Galán, C. D. Kilpatrick, D. Langeroodi, P. Macias, K. S. Mandel, R. Margutti, F. Matasić, P. McGill, J. D. R. Pierel, E. Ramirez-Ruiz, C. L. Ransome, C. Rojas-Bravo, M. R. Siebert, K. W. Smith, K. M. de Soto, M. C. Stroh, S. Tanyanont, K. Taggart, S. M. Ward, R. Wojtak, K. Auchettl, P. K. Blanchard, T. J. L. de Boer, B. M. Boyd, C. M. Carroll, K. C. Chambers, L. DeMarchi, G. Dimitriadis, S. A. Dodd, N. Earl, D. Farias, H. Gao, S. Gomez, M. Grayling, C. Grillo, E. E. Hayes, T. Hung, L. Izzo, N. Khetan, A. N. Kolborg, J. A. P. Law-Smith, N. LeBaron, C. C. Lin, Y. Luo, E. A. Magnier, D. Matthews, B. Mockler, A. J. G. O’Grady, Y. C. Pan, C. A. Politsch, S. I. Raimundo, A. Rest, R. Ridden-Harper, A. Sarangi, S. L. Schröder, S. J. Smartt, G. Terreran, S. Thorp, J. Vazquez, R. J. Wainscoat, Q. Wang, A. R. Wasserman, S. K. Yadavalli, R. Yarza, Y. Zenati, and Young Supernova Experiment. *Astrophys. J. Suppl. Ser.*, May 2023. 266(1):9.
- [9] **A hierarchical Bayesian SED model for Type Ia supernovae in the optical to near-infrared.** K. S. Mandel, S. Thorp, **G. Narayan**, A. S. Friedman, and A. Avelino. *Mon. Not. R. Astron. Soc.*, Mar. 2022. 510(3):pp. 3939–3966.
- [10] **EI-CID: a filter for gravitational-wave electromagnetic counterpart identification.** D. Chatterjee, **G. Narayan**, P. D. Aleo, K. Malanchev, and D. Muthukrishna. *Mon. Not. R. Astron. Soc.*, Jan. 2022. 509(1):pp. 914–930.
- [11] **An Early-time Optical and Ultraviolet Excess in the Type-Ic SN 2020oi.** A. Gagliano, L. Izzo, C. D. Kilpatrick, B. Mockler, W. V. Jacobson-Galán, G. Terreran, G. Dimitriadis, Y. Zenati, K. Auchettl, M. R. Drout, **G. Narayan**, R. J. Foley, R. Margutti, A. Rest, D. O. Jones, C. Aganze, P. D. Aleo, A. J. Burgasser, D. A. Coulter, R. Gerasimov, C. Gall, J. Hjorth, C.-C. Hsu, E. A. Magnier, K. S. Mandel, A. L. Piro, C. A. Rojas-Bravo, M. R. Siebert, H. Stacey, M. C. Stroh, J. J. Swift, K. Taggart, S. Tanyanont, and S. Tanyanont. *Astrophys. J.*, Jan. 2022. 924(2):55.
- [12] **The ANTARES Astronomical Time-domain Event Broker.** T. Matheson, C. Stubens, N. Wolf, C.-H. Lee, **G. Narayan**, A. Saha, A. Scott, M. Soraisam, A. S. Bolton, B. Hauger, D. R. Silva, J. Kececioglu, C. Scheidegger, R. Snodgrass, P. D. Aleo, E. Evans-Jacquez, N. Singh, Z. Wang, S. Yang, and Z. Zhao. *Astronomical J.*, Mar. 2021. 161(3):107.

- [13] **SN 2018agk: A Prototypical Type Ia Supernova with a Smooth Power-law Rise in Kepler (K2).** Q. Wang, A. Rest, Y. Zenati, R. Ridden-Harper, G. Dimitriadis, **G. Narayan**, V. A. Villar, M. R. Magee, R. J. Foley, E. J. Shaya, P. Garnavich, L. Wang, L. Hu, A. Bódi, P. Armstrong, K. Auchettl, T. Barclay, G. Barentsen, Z. Bognár, J. Brimacombe, J. Bulger, J. Burke, P. Challis, K. Chambers, D. A. Coulter, G. Csörnyei, B. Cseh, M. Deckers, J. L. Dotson, L. Galbany, S. González-Gaitán, M. Gromadzki, M. Gully-Santiago, O. Hanyecz, C. Hedges, D. Hiramatsu, G. Hosseinzadeh, D. A. Howell, S. B. Howell, M. E. Huber, S. W. Jha, D. O. Jones, R. Könyves-Tóth, C. Kalup, C. D. Kilpatrick, L. Kriskovics, W. Li, T. B. Lowe, S. Margheim, C. McCully, A. Mitra, J. A. Muñoz, M. Nicholl, J. Nordin, A. Pál, Y.-C. Pan, A. L. Piro, S. Rest, J. Rino-Silvestre, C. Rojas-Bravo, K. Sárneczky, M. R. Siebert, S. J. Smartt, K. Smith, Á. Sódor, M. D. Stritzinger, R. Szabó, R. Szakáts, B. E. Tucker, J. Vinkó, X. Wang, J. C. Wheeler, D. R. Young, A. Zenteno, K. Zhang, and G. Zsidi. *Astrophys. J.*, Dec. 2021. 923(2):167.
- [14] **Testing the consistency of dust laws in SN Ia host galaxies: a BAYESN examination of Foundation DRI.** S. Thorp, K. S. Mandel, D. O. Jones, S. M. Ward, and **G. Narayan**. *Mon. Not. R. Astron. Soc.*, Dec. 2021. 508(3):pp. 4310–4331.
- [15] **GHOST: Using Only Host Galaxy Information to Accurately Associate and Distinguish Supernovae.** A. Gagliano, **G. Narayan**, A. Engel, M. Carrasco Kind, and LSST Dark Energy Science Collaboration. *Astrophys. J.*, Feb. 2021. 908(2):170.
- [16] **The Young Supernova Experiment: Survey Goals, Overview, and Operations.** D. O. Jones, R. J. Foley, **G. Narayan**, J. Hjorth, M. E. Huber, P. D. Aleo, K. D. Alexander, C. R. Angus, K. Auchettl, V. F. Baldassare, S. H. Bruun, K. C. Chambers, D. Charterjee, D. L. Coppejans, D. A. Coulter, L. DeMarchi, G. Dimitriadis, M. R. Drout, A. Engel, K. D. French, A. Gagliano, C. Gall, T. Hung, L. Izzo, W. V. Jacobson-Galán, C. D. Kilpatrick, H. Korhonen, R. Margutti, S. I. Raimundo, E. Ramirez-Ruiz, A. Rest, C. Rojas-Bravo, M. R. Siebert, S. J. Smartt, K. W. Smith, G. Terreran, Q. Wang, R. Wojtak, A. Agnello, Z. Ansari, N. Arendse, A. Baldeschi, P. K. Blanchard, D. Brethauer, J. S. Bright, J. S. Brown, T. J. L. de Boer, S. A. Dodd, J. R. Fairlamb, C. Grillo, A. Hajela, C. Hede, A. N. Kolborg, J. A. P. Law-Smith, C. C. Lin, E. A. Magnier, K. Malanchev, D. Matthews, B. Mockler, D. Muthukrishna, Y. C. Pan, H. Pfister, D. K. Ramanah, S. Rest, A. Sarangi, S. L. Schröder, C. Stauffer, M. C. Stroh, K. L. Taggart, S. Tinyanont, R. J. Wainscoat, and Young Supernova Experiment. *Astrophys. J.*, Feb. 2021. 908(2):143.
- [17] **Models and Simulations for the Photometric LSST Astronomical Time Series Classification Challenge (PLAs-TiCC).** R. Kessler, **G. Narayan**, A. Avelino, E. Bachelet, R. Biswas, P. J. Brown, D. F. Chernoff, A. J. Connolly, M. Dai, S. Daniel, R. Di Stefano, M. R. Drout, L. Galbany, S. González-Gaitán, M. L. Graham, R. Hložek, E. E. O. Ishida, J. Guillochon, S. W. Jha, D. O. Jones, K. S. Mandel, D. Muthukrishna, A. O'Grady, C. M. Peters, J. R. Pierel, K. A. Ponder, A. Prša, S. Rodney, V. A. Villar, LSST Dark Energy Science Collaboration, and Transient and Variable Stars Science Collaboration. *Publ. Astron. Soc. Pac.*, Sep 2019. 131(1003):p. 094501.
- [18] **A machine learning classifier for microlensing in wide-field surveys.** D. Godines, E. Bachelet, **G. Narayan**, and R. A. Street. *Astronomy and Computing*, Jul 2019. 28:100298.
- [19] **Subpercent Photometry: Faint DA White Dwarf Spectrophotometric Standards for Astrophysical Observatories.** **G. Narayan**, T. Matheson, A. Saha, T. Axelrod, A. Calamida, E. Olszewski, J. Claver, K. S. Mandel, R. C. Bohlin, and J. B. Holberg. *Astrophys. J. Suppl. Ser.*, Apr 2019. 241(2):20.
- [20] **RAPID: Early Classification of Explosive Transients Using Deep Learning.** D. Muthukrishna, **G. Narayan**, K. S. Mandel, R. Biswas, and R. Hložek. *Publ. Astron. Soc. Pac.*, Nov. 2019. 131(1005):p. 118002.
- [21] **Machine-learning-based Brokers for Real-time Classification of the LSST Alert Stream.** **G. Narayan**, T. Zaidi, M. D. Soraism, Z. Wang, M. Lochner, T. Matheson, A. Saha, S. Yang, Z. Zhao, J. Kececioglu, C. Scheidegger, R. T. Snodgrass, T. Axelrod, T. Jenness, R. S. Maier, S. T. Ridgway, R. L. Seaman, E. M. Evans, N. Singh, C. Taylor, J. Toeniskoetter, E. Welch, S. Zhu, and ANTARES Collaboration. *Astrophys. J. Suppl. Ser.*, May 2018. 236:9.
- [22] **Photometry and Spectroscopy of Faint Candidate Spectrophotometric Standard DA White Dwarfs.** A. Calamida, T. Matheson, A. Saha, E. Olszewski, **G. Narayan**, J. Claver, C. Shanahan, J. Holberg, T. Axelrod, and R. Bohlin. *Astrophys. J.*, Feb 2019. 872(2):199.
- [23] **Light Curves of 213 Type Ia Supernovae from the ESSENCE Survey.** **G. Narayan**, A. Rest, B. E. Tucker, R. J. Foley, W. M. Wood-Vasey, P. Challis, C. Stubbs, R. P. Kirshner, C. Aguilera, A. C. Becker, S. Blondin, A. Clocchiatti, R. Covarrubias, G. Damke, T. M. Davis, A. V. Filippenko, M. Ganeshalingam, A. Garg, P. M. Garnavich, M. Hicken, S. W. Jha, K. Krisciunas, B. Leibundgut, W. Li, T. Matheson, G. Miknaitis, G. Pignata, J. L. Prieto, A. G. Riess, B. P. Schmidt, J. M. Silverman, R. C. Smith, J. Sollerman, J. Spyromilio, N. B. Suntzeff, J. L. Tonry, and A. Zenteno. *Astrophys. J. Suppl. Ser.*, May 2016. 224:3.
- [24] **Toward a Network of Faint DA White Dwarfs as High-precision Spectrophotometric Standards.** **G. Narayan**, T. Axelrod, J. B. Holberg, T. Matheson, A. Saha, E. Olszewski, J. Claver, C. W. Stubbs, R. C. Bohlin, S. Deustua, and A. Rest. *Astrophys. J.*, May 2016. 822:67.
- [25] **Displaying the Heterogeneity of the SN 2002cx-like Subclass of Type Ia Supernovae with Observations of the Pan-STARRS-1 Discovered SN 2009ku.** **G. Narayan**, R. J. Foley, E. Berger, M. T. Botticella, R. Chornock, M. E. Huber, A. Rest, D. Scolnic, S. Smartt, S. Valenti, A. M. Soderberg, W. S. Burgett, K. C. Chambers, H. A. Flewelling, G. Gates, T. Grav, N. Kaiser, R. P. Kirshner, E. A. Magnier, J. S. Morgan, P. A. Price, A. G. Riess, C. W. Stubbs, W. E. Sweeney, J. L. Tonry, R. J. Wainscoat, C. Waters, and W. M. Wood-Vasey. *Astrophys. J. Lett.*, Apr. 2011. 731:L11.
- [26] **Type Ia Supernova Light Curve Inference: Hierarchical Models in the Optical and Near-infrared.** K. S. Mandel, **G. Narayan**, and R. P. Kirshner. *Astrophys. J.*, Apr. 2011. 731:120.



- [27] **SN 2006bt: A Perplexing, Troublesome, and Possibly Misleading Type Ia Supernova.** R. J. Foley, **G. Narayan**, P. J. Challis, A. V. Filippenko, R. P. Kirshner, J. M. Silverman, and T. N. Steele. *Astrophys. J.*, Jan. 2010. 708:pp. 1748–1759.
- [28] **Survey requirements for accurate and precise photometric redshifts for Type Ia supernovae.** Y. Wang, **G. Narayan**, and M. Wood-Vasey. *Mon. Not. R. Astron. Soc.*, Nov. 2007. 382:pp. 377–381.
- [29] **The Complete Light-curve Sample of Spectroscopically Confirmed SNe Ia from Pan-STARRS1 and Cosmological Constraints from the Combined Pantheon Sample.** D. M. Scolnic, D. O. Jones, A. Rest, Y. C. Pan, R. Chornock, R. J. Foley, M. E. Huber, R. Kessler, **G. Narayan**, A. G. Riess, S. Rodney, E. Berger, D. J. Brout, P. J. Challis, M. Drouot, D. Finkbeiner, R. Lunnan, R. P. Kirshner, N. E. Sanders, E. Schlafly, S. Smartt, C. W. Stubbs, J. Tonry, W. M. Wood-Vasey, M. Foley, J. Hand, E. Johnson, W. S. Burgett, K. C. Chambers, P. W. Draper, K. W. Hodapp, N. Kaiser, R. P. Kudritzki, E. A. Magnier, N. Metcalfe, F. Bresolin, E. Gall, R. Kotak, M. McCrum, and K. W. Smith. *Astrophys. J.*, Jun. 2018. 859:101.
- [30] **Cosmological Constraints from Measurements of Type Ia Supernovae Discovered during the First 1.5 yr of the Pan-STARRS1 Survey.** A. Rest, D. Scolnic, R. J. Foley, M. E. Huber, R. Chornock, **G. Narayan**, J. L. Tonry, E. Berger, A. M. Soderberg, C. W. Stubbs, A. Riess, R. P. Kirshner, S. J. Smartt, E. Schlafly, S. Rodney, M. T. Botticella, D. Brout, P. Challis, I. Czekala, M. Drouot, M. J. Hudson, R. Kotak, C. Leibler, R. Lunnan, G. H. Marion, M. McCrum, D. Milisavljevic, A. Pastorello, N. E. Sanders, K. Smith, E. Stafford, D. Thilker, S. Valenti, W. M. Wood-Vasey, Z. Zheng, W. S. Burgett, K. C. Chambers, L. Denneau, P. W. Draper, H. Flewelling, K. W. Hodapp, N. Kaiser, R.-P. Kudritzki, E. A. Magnier, N. Metcalfe, P. A. Price, W. Sweeney, R. Wainscoat, and C. Waters. *Astrophys. J.*, Nov. 2014. 795:44.
- [31] **Systematic Uncertainties Associated with the Cosmological Analysis of the First Pan-STARRS1 Type Ia Supernova Sample.** D. Scolnic, A. Rest, A. Riess, M. E. Huber, R. J. Foley, D. Brout, R. Chornock, **G. Narayan**, J. L. Tonry, E. Berger, A. M. Soderberg, C. W. Stubbs, R. P. Kirshner, S. Rodney, S. J. Smartt, E. Schlafly, M. T. Botticella, P. Challis, I. Czekala, M. Drouot, M. J. Hudson, R. Kotak, C. Leibler, R. Lunnan, G. H. Marion, M. McCrum, D. Milisavljevic, A. Pastorello, N. E. Sanders, K. Smith, E. Stafford, D. Thilker, S. Valenti, W. M. Wood-Vasey, Z. Zheng, W. S. Burgett, K. C. Chambers, L. Denneau, P. W. Draper, H. Flewelling, K. W. Hodapp, N. Kaiser, R.-P. Kudritzki, E. A. Magnier, N. Metcalfe, P. A. Price, W. Sweeney, R. Wainscoat, and C. Waters. *Astrophys. J.*, Nov. 2014. 795:45.
- [32] **GALEX and Pan-STARRS1 Discovery of SN IIP 2010aq: The First Few Days After Shock Breakout in a Red Supergiant Star.** S. Gezari, A. Rest, M. E. Huber, **G. Narayan**, K. Forster, J. D. Neill, D. C. Martin, S. Valenti, S. J. Smartt, R. Chornock, E. Berger, A. M. Soderberg, S. Mattila, E. Kankare, W. S. Burgett, K. C. Chambers, T. Dombeck, T. Grav, J. N. Heasley, K. W. Hodapp, R. Jedicke, N. Kaiser, R. Kudritzki, G. Luppino, R. H. Lupton, E. A. Magnier, D. G. Monet, J. S. Morgan, P. M. Onaka, P. A. Price, P. H. Rhoads, W. A. Siegmund, C. W. Stubbs, J. L. Tonry, R. J. Wainscoat, M. F. Waterson, and C. G. Wynn-Williams. *Astrophys. J. Lett.*, Sep. 2010. 720:pp. L77–L81.

## Unrefereed Publications

- [33] **Windows on the Universe: Establishing the Infrastructure for a Collaborative Multi-messenger Ecosystem.** The 2023 Windows on the Universe Workshop White Paper Working Group, T. Ahumada, J. E. Andrews, S. Antier, E. Blaufuss, P. R. Brady, A. M. Brazier, E. Burns, S. B. Cenko, P. Chandra, D. Chatterjee, A. Corsi, M. W. Coughlin, D. A. Coulter, S. Fu, A. Goldstein, L. P. Guy, E. J. Hooper, S. B. Howell, T. B. Humensky, J. A. Kennea, S. M. Jarrett, R. M. Lau, T. R. Lewis, L. Lu, T. Matheson, B. W. Miller, **G. Narayan**, R. Nikutta, J. K. Rajagopal, A. Rest, K. M. Ruiz-Rocha, J. Runnoe, D. J. Sand, M. Santander, H. A. A. Solares, M. D. So-raisam, R. A. Street, A. Tohuvavohu, J. Vieira, A. Vierende, S. J. Vigeland, S. Vitale, N. E. White, S. D. Wyatt, and T. Yuan. *arXiv e-prints*, Jan. 2024. arXiv:2401.02063.
- [34] **The Future of Astronomical Data Infrastructure: Meeting Report.** M. R. Blanton, J. D. Evans, D. Norman, W. O'Mullane, A. Price-Whelan, L. Rizzi, A. Accomazzi, M. Ansde, S. Bailey, P. Barrett, S. Berukoff, A. Bolton, J. Borrill, K. Cruz, J. Dalcanton, V. Desai, G. P. Dubois-Felsmann, F. Economou, H. Ferguson, B. Field, D. Foreman-Mackey, J. Forero-Romero, N. Gaffney, K. Gillies, M. J. Graham, S. Gwyn, J. Hennawi, A. L. H. Hughes, T. Jaffe, P. Jagannathan, T. Jenness, M. Jurić, J. Kavelaars, K. Kee, J. Kern, A. Kremin, K. Labrie, M. Lacy, C. Law, R. Martínez-Galarza, C. McCully, J. McEnery, B. Miller, C. Moriarty, A. Muench, D. Muna, A. Murillo, **G. Narayan**, J. D. Neill, R. Nikutta, R. Ojha, K. Olsen, J. O'Meara, B. Rusholme, R. Seaman, N. Starkman, M. Still, F. Stoeck, J. D. Swinbank, P. Teuben, I. Toledo, E. Tollerud, M. D. Turk, J. Turner, W. Vacca, J. Vieira, B. Weaver, B. Weiner, J. Weiss, K. Westfall, B. Willman, and L. Zhao. *arXiv e-prints*, Nov. 2023. arXiv:2311.04272.
- [35] **Applications of Deep Learning to physics workflows.** M. Agarwal, J. Alameda, J. Audenaert, W. Benoit, D. Beveridge, M. Bhattacharya, C. Chatterjee, D. Chatterjee, A. Chen, M. Saleem Cholyil, C.-J. Chou, S. Choudhary, M. Coughlin, M. Dax, A. De-sai, A. Di Luca, J. M. Duarte, S. Farrell, Y. Feng, P. Goodarzi, E. Govorkova, M. Graham, J. Guiang, A. Gunny, W. Guo, J. Hakenmueller, B. Hawks, S.-C. Hsu, P. Jawahar, X. Ju, E. Katsavounidis, M. Kellis, E. E Khoda, F. Zahra Lahbabi, V. Tha Bik Lian, M. Liu, K. Malanchev, E. Marx, W. P. McCormack, A. McLeod, G. Mo, E. A. Moreno, D. Muthukrishna, **G. Narayan**, A. Naylor, M. Neubauer, M. Nor-man, R. Omer, K. Pedro, J. Peterson, M. Pürer, R. Raikman, S. Raj, G. Ricker, J. Robbins, B. Safarzadeh Samani, K. Scholberg, A. Schuy, V. Skiris, S. Soni, N. Sravan, P. Sutton, V. A. Villar, X. Wang, L. Wen, F. Wuertwein, T. Yang, and S.-W. Yeh. *arXiv e-prints*, Jun. 2023. arXiv:2306.08106.
- [36] **Snowmass2021 Cosmic Frontier CF6 White Paper: Multi-Experiment Probes for Dark Energy – Transients.** A. G. Kim, A. Palmese, M. E. S. Pereira, G. Aldering, F. Andrade-Oliveira, J. Annis, S. Bailey, S. BenZvi, U. Braga-Neto, F. Courbin, A. Garcia, D. Jeffery, **G. Narayan**, S. Perlmutter, M. Soares-Santos, T. Treu, and L. Wang. *arXiv e-prints*, Mar. 2022. arXiv:2203.111226.

- [37] **Machine Learning and Cosmology.** C. Dvorkin, S. Mishra-Sharma, B. Nord, V. A. Villar, C. Avestruz, K. Bechtol, A. Čiprijanović, A. J. Connolly, L. H. Garrison, **G. Narayan**, and F. Villaescusa-Navarro. *arXiv e-prints*, Mar. 2022. arXiv:2203.08056.
- [38] **The DECam Young Supernova Experiment.** A. Rest, S. Dhawan, K. Mandel, S. Thorp, S. Ward, A. Agnello, C. R. Angus, Z. Ansari, N. Arendse, C. Cold, D. Farias, C. Gall, C. Grillo, S. H. Bruun, J. Hjorth, A. Kolborg, L. Izzo, N. Khetan, S. L. Schröder, H. Korhonen, S. Raimundo, D. K. Ramanah, A. Sarangi, R. Wojtak, H. Pfister, K. Auchettl, M. Soraisam, K. C. Chambers, M. E. Huber, E. A. Magnier, T. J. L. D. Boer, J. R. Fairlamb, C. C. Lin, R. J. Wainscoat, T. Lowe, M. Willman, J. Bulger, A. S. B. Schultz, P. D. Aleo, D. Chatterjee, N. Earl, K. D. French, A. Gagliano, K. L. Malanchev, F. Matasic, **G. Narayan**, S. Sharief, A. Thiruvengadam, J. Vazquez, R. Angulo, Q. Wang, G. Terreran, Y. C. Pan, F. Valdes, A. Zenteno, K. Alexander, P. Blanchard, L. DeMarchi, A. Hajela, C. D. Kilpatrick, C. Stauffer, M. Stroh, V. A. Villar, K. D. Soto, K. Yadavalli, S. J. Smartt, K. W. Smith, S. Gomez, J. Pierel, L. Strolger, G. Dimitriadis, W. Jacobson-Galán, R. Margutti, D. Matthews, D. A. Coulter, K. W. Davis, S. A. Dodd, R. J. Foley, D. Jones, J. A. P. Law-Smith, B. Mockler, C. Rojas-Bravo, M. R. Siebert, K. Taggart, S. Tanyanont, E. Ramirez-Ruiz, R. Ridden-Harper, M. Drout, and V. F. Baldassare. *Transient Name Server AstroNote*, Jan. 2022. 24:p. 1.
- [39] L. P. Guy, J.-C. Cuillandre, E. Bachelet, M. Banerji, F. E. Bauer, T. Collett, C. J. Conselice, S. Eggli, A. Ferguson, A. Fontana, C. Heymans, I. M. Hook, É. Aubourg, H. Aussel, J. Bosch, B. Carry, H. Hoekstra, K. Kuijken, F. Lanusse, P. Melchior, J. Mohr, M. Moresco, R. Nakajima, S. Paltani, M. Troxel, V. Allevato, A. Amara, S. Andreone, T. Anguita, S. Bardelli, K. Bechtol, S. Birrer, L. Bisigello, M. Bolzonella, M. T. Botticella, H. Bouy, J. Brinchmann, S. Brough, S. Camera, M. Cantiello, E. Cappellaro, J. L. Carlin, F. J. Castander, M. Castellano, R. R. Chari, N. E. Chisari, C. Collins, F. Courbin, J.-G. Cuby, O. Cucciati, T. Daylan, J. M. Diego, P.-A. Duc, S. Fotopoulou, D. Fouchez, R. Gavazzi, D. Gruen, P. Hatfield, H. Hildebrandt, H. Landt, L. K. Hunt, R. Ibata, O. Ilbert, J. Jasche, B. Joachimi, R. Joseph, R. Kotak, C. Laigle, A. Lançon, S. S. Larsen, G. Lavaux, F. Leclercq, C. D. Leonard, A. von der Linden, X. Liu, G. Longo, M. Magliocchetti, C. Maraston, P. Marshall, E. L. Martín, S. Mattila, M. Maturi, H. J. McCracken, R. B. Metcalf, M. Montes, D. Mortlock, L. Moscardini, **G. Narayan**, M. Paolillo, P. Papaderos, R. Pello, L. Pozzetti, M. Radovich, M. Rejkuba, J. Román, R. Sánchez-Janssen, E. Sarpa, B. Sartoris, T. Schrabback, D. Sluse, S. J. Smartt, G. P. Smith, C. Snodgrass, M. Talia, C. Tao, S. Toft, C. Tortora, I. Tutusaus, C. Usher, S. van Velzen, A. Verma, G. Vernardos, K. Voggel, B. Wandelt, A. E. Watkins, J. Weller, A. H. Wright, P. Yoachim, I. Yoon, and E. Zucca. **Rubin-Euclid Derived Data Products: Initial Recommendations.** In *Zenodo id. 5836022*, vol. 58. Jan. 2022 p. 5836022.
- [40] **Synergies between Vera C. Rubin Observatory, Nancy Grace Roman Space Telescope, and Euclid Mission: Constraining Dark Energy with Type Ia Supernovae.** B. M. Rose, G. Aldering, M. Dai, S. Deustua, R. J. Foley, E. Gangler, P. Gris, I. M. Hook, R. Kessler, **G. Narayan**, P. Nugent, K. A. Ponder, S. Perlmutter, B. Racine, D. Rubin, B. O. Sánchez, D. M. Scolnic, W. M. Wood-Vasey, D. Brout, A. Cikota, D. Fouchez, P. M. Garnavich, R. Hounsell, M. Sako, C. Tao, S. W. Jha, D. O. Jones, L. Strolger, and H. Qu. *arXiv e-prints*, Apr. 2021. arXiv:2104.01199.
- [41] **Recommended Target Fields for Commissioning the Vera C. Rubin Observatory.** A. Amon, K. Bechtol, A. J. Connolly, S. W. Digel, A. Drlica-Wagner, E. Gawiser, M. Jarvis, S. W. Jha, A. von der Linden, M. Moniez, **G. Narayan**, N. Regnault, I. Sevilla-Noarbe, S. J. Schmidt, S. H. Suyu, and C. W. Walter. *arXiv e-prints*, Oct. 2020. arXiv:2010.15318.
- [42] **Astro2020 APC White Paper: Elevating the Role of Software as a Product of the Research Enterprise.** A. M. Smith, D. Norman, K. Cruz, V. a. Desai, E. Bellm, B. Lundgren, F. Economou, B. D. Nord, C. Schafer, **G. Narayan**, J. Harrington, E. Tollerud, B. Sipőcz, T. Pickering, M. S. Peebles, B. Berriman, P. Teuben, D. Rodriguez, A. Gradwohl, L. Shamir, A. Allen, J. R. Brownstein, A. Ginsburg, M. Sinha, C. Hummels, B. Smith, H. Stevance, A. Price-Whelan, B. Cherinka, C.-k. Chan, J. Kartaltepe, M. Turk, B. Weiner, M. Modjaz, R. J. Nemiroff, W. Kerzendorf, I. Laginja, C. Dong, B. Merín, J. Sobeck, D. Buzasi, J. K. Faherty, I. Momcheva, A. Connolly, and V. Z. Golkhou. *arXiv e-prints*, Jul 2019. arXiv:1907.06981.
- [43] **Discovery Frontiers of Explosive Transients: An ELT and LSST Perspective.** M. Graham, D. Milisavljevic, A. Rest, J. C. Wheeler, R. Chornock, R. Margutti, J. Rho, C.-H. Lee, S.-C. Yoon, C. D. Kilpatrick, **G. Narayan**, N. Smith, G. G. Williams, N. Sravan, P. Cowperthwaite, D. Coppejans, G. Terreran, A. Baldeschi, V. Z. Golkhou, and S. Starrfield. *Bull. Am. Astron. Soc.*, May 2019. 51(3):339.
- [44] **Cyberinfrastructure Requirements to Enhance Multi-messenger Astrophysics.** P. Chang, G. Allen, W. Anderson, F. B. Bianco, J. S. Bloom, P. R. Brady, A. Brazier, S. B. Cenko, S. M. Couch, T. DeYoung, E. Deelman, Z. B. Etienne, R. J. Foley, D. B. Fox, V. Z. Golkhou, D. R. Grant, C. Hanna, C. Holley-Bockelmann, D. A. Howell, E. A. Huerta, M. W. G. Johnson, M. Juric, D. L. Kaplan, D. S. Katz, A. Keivani, W. Kerzendorf, C. Kopfer, M. T. Lam, L. Lehner, Z. Marka, S. Marka, J. Nabrzyski, **G. Narayan**, B. W. O'Shea, D. Petravick, R. Quick, R. A. Street, I. Taboada, F. Timmes, M. J. Turk, A. Weltman, and Z. Zhang. *Bull. Am. Astron. Soc.*, May 2019. 51(3):436.
- [45] **Petabytes to Science.** A. E. Bauer, E. C. Bellm, A. S. Bolton, S. Chaudhuri, A. J. Connolly, K. L. Cruz, V. Desai, A. Drlica-Wagner, F. Economou, N. Gaffney, J. Kavelaars, J. Kinney, T. S. Li, B. Lundgren, R. Margutti, **G. Narayan**, B. Nord, D. J. Norman, W. O'Mullane, S. Padhi, J. E. G. Peek, C. Schafer, M. E. Schwamb, A. M. Smith, E. J. Tollerud, A.-M. Weijmans, and A. S. Szalay. *arXiv e-prints*, May 2019. arXiv:1905.05116.
- [46] **The Next Generation of Cosmological Measurements with Type Ia Supernovae.** D. Scolnic, S. Perlmutter, G. Aldering, D. Brout, T. Davis, A. Filippenko, R. Foley, R. Hložek, R. Hounsell, D. Jones, P. Kelly, D. Rubin, A. Riess, S. Rodney, J. Roberts-Pierel, Y. Wang, J. Asorey, A. Avelino, C. Bavdhanekar, P. J. Brown, A. Challinor, C. Balland, A. Cooray, S. Dhawan, G. Dimitriadis, C. Dvorkin, J. Guy, W. Handley, R. E. Keeley, J.-P. Kneib, B. L'Huillier, M. Lattanzi, K. Mandel, J. Mertens, M. Rigault, P. Motloch, S. Mukherjee, **G. Narayan**, A. Nomerotski, L. Page, L. Pogossian, G. Puglisi, M. Raveri, N. Regnault, A. Rest, C. Rojas-Bravo, M. Sako, F. Shi, S. Sridhar, A. Suzuki, Y.-D. Tsai, W. M. Wood-Vasey, Y. Copin, G.-B. Zhao, and N. Zhu. *Astro2020: Decadal Survey on Astronomy and Astrophysics*, May 2019. 2020:p. 270.
- [47] **Multi-Messenger Astrophysics: Harnessing the Data Revolution.** G. Allen, W. Anderson, E. Blaufuss, J. S. Bloom, P. Brady, S. Burke-Spolaor, S. B. Cenko, A. Connolly, P. Couvares, D. Fox, A. Gal-Yam, S. Gezari, A. Goodman, D. Grant, P. Groot, J. Guillochon, C. Hanna, D. W. Hogg, K. Holley-Bockelmann, D. A. Howell, D. Kaplan, E. Katsavounidis, M. Kowalski, L. Lehner, D. Muthukrishna, **G. Narayan**, J. E. G. Peek, A. Saha, P. Shawhan, and I. Taboada. *ArXiv e-prints*, Jul. 2018.



- [48] **The Photometric LSST Astronomical Time-series Classification Challenge (PLAsTiCC): Data set.** The PLAsTiCC team, T. Allam, Jr., A. Bahmanyar, R. Biswas, M. Dai, L. Galbany, R. Hložek, E. E. O. Ishida, S. W. Jha, D. O. Jones, R. Kessler, M. Lochner, A. A. Mahabal, A. I. Malz, K. S. Mandel, J. R. Martínez-Galarza, J. D. McEwen, D. Muthukrishna, [G. Narayan](#), H. Peiris, C. M. Peters, K. Ponder, C. N. Setzer, The LSST Dark Energy Science Collaboration, T. LSST Transients, and Variable Stars Science Collaboration. *ArXiv e-prints*, Sep. 2018.
- [49] **PanSTARRS1 Observations of the Kepler/K2 Campaign 16 and 17 Fields.** J. L. Dotson, A. Rest, G. Barentsen, M. Gully-Santiago, S. W. Fleming, P. Garnavich, B. E. Tucker, D. Kasen, [G. Narayan](#), E. Shaya, R. Olling, S. Margheim, A. Zenteno, A. Villar, K. C. Chambers, H. A. Flewelling, M. E. Huber, E. A. Magnier, C. Z. Waters, A. S. B. Schultz, J. Bulger, T. B. Lowe, M. Willman, S. J. Smartt, and K. W. Smith. *Research Notes of the American Astronomical Society*, Sep. 2018. 2(3):178.
- [50] A. Saha, Z. Wang, T. Matheson, [G. Narayan](#), R. Snodgrass, J. Kececioglu, C. Scheidegger, T. Axelrod, T. Jenness, S. Ridgway, R. Seaman, C. Taylor, J. Toeniskoetter, E. Welch, S. Yang, and T. Zaidi. **ANTARES: Progress towards building a ‘Broker’ of time-domain alerts.** In *Observatory Operations: Strategies, Processes, and Systems VI*, vol. 9910 of *Proceedings of the SPIE*. Nov. 2016.
- [51] A. Saha, T. Matheson, R. Snodgrass, J. Kececioglu, [G. Narayan](#), R. Seaman, T. Jenness, and T. Axelrod. **ANTARES: a prototype transient broker system.** In *Observatory Operations: Strategies, Processes, and Systems V*, vol. 9149 of *Proceedings of the SPIE*. Jul. 2014 p. 914908.
- [52] **KEGS Discovery of 28 Supernova Candidates in the K2 Campaign 17 Field with DECam.** [G. Narayan](#), A. Rest, G. M. Strampelli, A. Zenteno, D. J. James, R. C. Smith, B. E. Tucker, P. Garnavich, S. Margheim, D. Kasen, R. Olling, E. Shaya, F. F. Buron, and V. A. Villar. *The Astronomer's Telegram*, May 2018. 11663.

and several other TNS alerts, ATEs, and CBATs.

## Other Publications

- [53] **All-sky Faint DA White Dwarf Spectrophotometric Standards for Astrophysical Observatories: The Complete Sample.** T. Axelrod, A. Saha, T. Matheson, E. W. Olszewski, R. C. Bohlin, A. Calamida, J. Claver, S. Deustua, J. B. Holberg, I. Hubeny, J. W. Mackenty, K. Malanchev, [G. Narayan](#), S. Points, A. Rest, E. Sabbi, and C. W. Stubbs. *Astrophys. J.*, Jul. 2023. 951(1):78.
- [54] **A BayeSN distance ladder:  $H_0$  from a consistent modelling of Type Ia supernovae from the optical to the near-infrared.** S. Dhawan, S. Thorp, K. S. Mandel, S. M. Ward, [G. Narayan](#), S. W. Jha, and T. Chant. *Mon. Not. R. Astron. Soc.*, Sep. 2023. 524(1):pp. 235–244.
- [55] **The Optical Light Curve of GRB 221009A: The Afterglow and the Emerging Supernova.** M. D. Fulton, S. J. Smartt, L. Rhodes, M. E. Huber, V. A. Villar, T. Moore, S. Srivastav, A. S. B. Schultz, K. C. Chambers, L. Izzo, J. Hjorth, T. W. Chen, M. Nicholl, R. J. Foley, A. Rest, K. W. Smith, D. R. Young, S. A. Sim, J. Bright, Y. Zenati, T. de Boer, J. Bulger, J. Fairlamb, H. Gao, C. C. Lin, T. Lowe, E. A. Magnier, I. A. Smith, R. Wainscoat, D. A. Coulter, D. O. Jones, C. D. Kilpatrick, P. McGill, E. Ramirez-Ruiz, K. S. Lee, [G. Narayan](#), V. Ramakrishnan, R. Ridden-Harper, A. Singh, Q. Wang, A. K. H. Kong, C. C. Ngeow, Y. C. Pan, S. Yang, K. W. Davis, A. L. Piro, C. Rojas-Bravo, J. Sommer, and S. K. Yadavalli. *Astrophys. J. Lett.*, Mar. 2023. 946(1):L22.
- [56] **Deep drilling in the time domain with DECam: survey characterization.** M. L. Graham, R. A. Knop, T. D. Kennedy, P. E. Nugent, E. Bellm, M. Catelan, A. Patel, H. Smotherman, M. Soraisam, S. Stetler, L. N. Aldoroty, A. Awbrey, K. Baeza-Villagra, P. H. Bernardinelli, F. Bianco, D. Brout, R. Clarke, W. I. Clarkson, T. Collett, J. R. A. Davenport, S. Fu, J. E. Gizis, A. Heinze, L. Hu, S. W. Jha, M. Jurić, J. B. Kalmbach, A. Kim, C.-H. Lee, C. Lidman, M. Magee, C. E. Martínez-Vázquez, T. Matheson, [G. Narayan](#), A. Palmese, C. A. Phillips, M. Rabus, A. Rest, N. Rodríguez-Segovia, R. Street, A. K. Vivas, L. Wang, N. Wolf, and J. Yang. *Mon. Not. R. Astron. Soc.*, Mar. 2023. 519(3):pp. 3881–3902.
- [57] **Real-time detection of anomalies in large-scale transient surveys.** D. Muthukrishna, K. S. Mandel, M. Lochner, S. Webb, and [G. Narayan](#). *Mon. Not. R. Astron. Soc.*, Nov. 2022. 517(1):pp. 393–419.
- [58] **Probing the evolution of Type Ia supernovae with their ejecta velocities.** Y. C. Pan, Y. S. Jheng, D. O. Jones, I. Y. Lee, R. J. Foley, R. Chornock, D. M. Scolnic, E. Berger, P. M. Challis, M. Drouot, M. E. Huber, R. P. Kirshner, R. Kotak, R. Lunnan, [G. Narayan](#), A. Rest, S. Rodney, and S. Smartt. *arXiv e-prints*, Nov. 2022. arXiv:2211.06895.
- [59] **Perfecting Our Set of Spectrophotometric Standard DA White Dwarfs.** A. Calamida, T. Matheson, E. W. Olszewski, A. Saha, T. Axelrod, C. Shanahan, J. Holberg, S. Points, [G. Narayan](#), K. Malanchev, R. Ridden-Harper, N. Gentile-Fusillo, R. Raddi, R. Bohlin, A. Rest, I. Hubeny, S. Deustua, J. Mackenty, E. Sabbi, and C. W. Stubbs. *Astrophys. J.*, Nov. 2022. 940(1):19.
- [60] **SNAD transient miner: Finding missed transient events in ZTF DR4 using k-D trees.** P. D. Aleo, K. L. Malanchev, M. V. Pruzhinskaya, E. E. O. Ishida, E. Russeil, M. V. Kornilov, V. S. Korolev, S. Sreejith, A. A. Volnova, and G. S. Narayan. *New Astronomy*, Oct. 2022. 96:101846.
- [61] **SN Ia Cosmology Analysis Results from Simulated LSST Images: From Difference Imaging to Constraints on Dark Energy.** B. O. Sánchez, R. Kessler, D. Scolnic, R. Armstrong, R. Biswas, J. Bogart, J. Chiang, J. Cohen-Tanugi, D. Fouchez, P. Gris, K. Heitmann, R. Hložek, S. Jha, H. Kelly, S. Liu, [G. Narayan](#), B. Racine, E. Rykoff, M. Sullivan, C. W. Walter, W. M. Wood-Vasey, and LSST Dark Energy Science Collaboration (DESC). *Astrophys. J.*, Aug. 2022. 934(2):96.

- [62] **Evidence for Extended Hydrogen-Poor CSM in the Three-Peaked Light Curve of Stripped Envelope Ib Supernova.** Y. Zenati, Q. Wang, A. Bobrick, L. DeMarchi, H. Glanz, M. Rozner, A. Rest, B. D. Metzger, R. Margutti, S. Gomez, N. Smith, S. Toonen, J. S. Bright, C. Norman, R. J. Foley, A. Gagliano, J. H. Krolik, S. J. Smartt, A. V. Villar, **G. Narayan**, O. Fox, K. Auchettl, D. Brethauer, A. Clocchiatti, S. V. Coelln, D. L. Coppejans, G. Dimitriadis, A. Doroschmai, M. Drout, W. Jacobson-Galan, B. Gao, R. Ridden-Harper, C. D. Kilpatrick, T. Laskar, D. Matthews, S. Rest, K. W. Smith, C. McKenzie Stauffer, M. C. Stroth, L.-G. Strolger, G. Terreran, J. D. R. Pierel, and A. L. Piro. *arXiv e-prints*, Jul. 2022. arXiv:2207.07146.
- [63] **Optical Rebrightening of Extragalactic Transients from the Zwicky Transient Facility.** M. Soraisam, T. Matheson, C.-H. Lee, A. Saha, **G. Narayan**, N. Wolf, A. Scott, S. Figueero, R. Nuñez, K. McKinnon, P. Guhathakurta, T. G. Brink, A. V. Filippenko, and N. Smith. *Astrophys. J. Lett.*, Feb. 2022. 926(2):L11.
- [64] **SN2017jgh: a high-cadence complete shock cooling light curve of a SN Iib with the Kepler telescope.** P. Armstrong, B. E. Tucker, A. Rest, R. Ridden-Harper, Y. Zenati, A. L. Piro, S. Hinton, C. Lidman, S. Margheim, **G. Narayan**, E. Shaya, P. Garnavich, D. Kasen, V. Villar, A. Zenteno, I. Arcavi, M. Drout, R. J. Foley, J. Wheeler, J. Anais, A. Campillay, D. Coulter, G. Dimitriadis, D. Jones, C. D. Kilpatrick, N. Muñoz-Elgueta, C. Rojas-Bravo, J. Vargas-González, J. Bulger, K. Chambers, M. Huber, T. Lowe, E. Mag-nier, B. J. Shappee, S. Smartt, K. W. Smith, T. Barclay, G. Barentsen, J. Dotson, M. Gully-Santiago, C. Hedges, S. Howell, A. Cody, K. Auchettl, A. Bódi, Z. Bognár, J. Brimacombe, P. Brown, B. Cseh, L. Galbany, D. Hiramatsu, T. W. S. Holoiien, D. A. Howell, S. W. Jha, R. Könyves-Tóth, L. Kriskovics, C. McCully, P. Milne, J. Muñoz, Y. Pan, A. Pál, H. Sai, K. Sárneczky, N. Smith, Á. Sódor, R. Szabó, R. Szakáts, S. Valenti, J. Vinkó, X. Wang, K. Zhang, and G. Zsidi. *Mon. Not. R. Astron. Soc.*, Nov. 2021. 507(3):pp. 3125–3138.
- [65] **AT 2020iko: A WZ Sge-type Dwarf Nova Candidate with an Anomalous Precursor Event.** M. D. Soraisam, S. R. DeSantis, C.-H. Lee, T. Matheson, **G. Narayan**, A. Saha, D. J. Sand, C. Stubens, P. Szkody, N. Wolf, S. D. Wyatt, R. Hosokawa, N. Kawai, and K. L. Murata. *Astronomical J.*, Jan. 2021. 161(1):15.
- [66] **SOAR/Goodman Spectroscopic Assessment of Candidate Counterparts of the LIGO/Virgo Event GW190814.** D. L. Tucker, M. P. Wiesner, S. S. Allam, M. Soares-Santos, C. R. Bom, M. Butner, A. Garcia, R. Morgan, F. Olivares E., A. Palmese, L. Santana-Silva, A. Shrivastava, J. Annis, J. García-Bellido, M. S. S. Gill, K. Herner, C. D. Kilpatrick, M. Makler, N. Sherman, A. Amara, H. Lin, M. Smith, E. Swann, I. Arcavi, T. G. Bachmann, K. Bechtol, F. Berlfein, C. Briceño, D. Brout, R. E. Butler, R. Cartier, J. Casares, H. Y. Chen, C. Conselice, C. Contreras, E. Cook, J. Cooke, K. Dage, C. D’Andrea, T. M. Davis, R. de Carvalho, H. T. Diehl, J. P. Di-etch, Z. Doctor, A. Drlica-Wagner, M. Drout, B. Farr, D. A. Finley, M. Fishbach, R. J. Foley, F. Förster-Burón, P. Fosalba, D. Friedel, J. Frieman, C. Frohmaier, R. A. Gruendl, W. G. Hartley, D. Hiramatsu, D. E. Holz, D. A. Howell, A. Kawash, R. Kessler, N. Kuropatkin, O. Lahav, A. Lundgren, M. Lundquist, U. Malik, A. W. Mann, J. Marriner, J. L. Marshall, C. E. Martínez-Vázquez, C. McCully, F. Menanteau, N. Meza, **G. Narayan**, E. Neilsen, C. Nicolaou, R. Nichol, F. Paz-Chinchón, M. E. S. Pereira, J. Pineda, S. Points, J. Quirola-Vásquez, S. Rembold, A. Rest, Ó. Rodríguez, A. K. Romer, M. Sako, S. Salim, D. Scolnic, J. A. Smith, J. Strader, M. Sullivan, M. E. C. Swanson, D. Thomas, S. Valenti, T. N. Varga, A. R. Walker, J. Weller, M. L. Wood, B. Yanny, A. Zenteno, M. Agüena, F. Andrade-Oliveira, E. Bertin, D. Brooks, D. L. Burke, A. C. Rosell, M. C. Kind, J. Carretero, M. Costanzi, L. N. da Costa, J. De Vicente, S. Desai, S. Everett, I. Fer-rero, B. Flaugher, E. Gaztanaga, D. W. Gerdes, D. Gruen, J. Gschwend, G. Gutierrez, S. R. Hinton, D. L. Hollowood, K. Honscheid, D. J. James, K. Kuehn, M. Lima, M. A. G. Maia, R. Miquel, R. L. C. Ogando, A. Pieres, A. A. Plazas Malagón, M. Rodríguez-Monroy, E. Sanchez, V. Scarpine, M. Schubnell, S. Serrano, I. Sevilla-Noarbe, E. Suchyta, G. Tarle, C. To, and Y. Zhang. *Astrophys. J.*, Apr. 2022. 929(2):115.
- [67] **Witnessing history: sky distribution, detectability, and rates of naked-eye Milky Way supernovae.** C. T. Mur-phy, J. W. Hogan, B. D. Fields, and **G. Narayan**. *Mon. Not. R. Astron. Soc.*, Oct. 2021. 507(1):pp. 927–943.
- [68] **A Classification Algorithm for Time-domain Novelties in Preparation for LSST Alerts. Application to Vari-able Stars and Transients Detected with DECam in the Galactic Bulge.** M. D. Soraisam, A. Saha, T. Matheson, C.-H. Lee, **G. Narayan**, A. K. Vivas, C. Scheidegger, N. Oppermann, E. W. Olszewski, S. Sinha, S. R. Desantis, and ANTARES Collaboration. *Astrophys. J.*, Apr. 2020. 892(2):112.
- [69] **Constraining Type Iax supernova progenitor systems with stellar population age dating.** T. Takaro, R. J. Foley, C. McCully, W.-f. Fong, S. W. Jha, **G. Narayan**, A. Rest, M. Stritzinger, and K. McKinnon. *Mon. Not. R. Astron. Soc.*, Mar. 2020. 493(1):pp. 986–1002.
- [70] **Optical Polarimetry of the Tidal Disruption Event AT2019DSG.** C.-H. Lee, T. Hung, T. Matheson, M. Soraisam, **G. Narayan**, A. Saha, C. Stubens, and N. Wolf. *Astrophys. J. Lett.*, Mar. 2020. 892(1):L1.
- [71] **ZTF18abhjrcf: The First R Coronae Borealis Star from the Zwicky Transient Facility Public Survey.** C.-H. Lee, T. Matheson, M. Soraisam, **G. Narayan**, A. Saha, C. Stubens, and N. Wolf. *Astronomical J.*, Feb. 2020. 159(2):61.
- [72] **Delay Time Distributions of Type Ia Supernovae from Galaxy and Cosmic Star Formation Histories.** L.-G. Strolger, S. A. Rodney, C. Pacifici, **G. Narayan**, and O. Graur. *Astrophys. J.*, Feb. 2020. 890(2):140.
- [73] **The Foundation Supernova Survey: Measuring Cosmological Parameters with Supernovae from a Single Tele-scope.** D. O. Jones, D. M. Scolnic, R. J. Foley, A. Rest, R. Kessler, P. M. Challis, K. C. Chambers, D. A. Coulter, K. G. Dettman, M. M. Foley, M. E. Huber, S. W. Jha, E. Johnson, C. D. Kilpatrick, R. P. Kirshner, J. Manuel, **G. Narayan**, Y. C. Pan, A. G. Riess, A. S. B. Schultz, M. R. Siebert, E. Berger, R. Chornock, H. Flewelling, E. A. Magnier, S. J. Smartt, K. W. Smith, R. J. Wainscoat, C. Waters, and M. Willman. *Astrophys. J.*, Aug 2019. 881(1):19.
- [74] **Presto-Color: A Photometric Survey Cadence for Explosive Physics and Fast Transients.** F. B. Bianco, M. R. Drout, M. L. Graham, T. A. Pritchard, R. Biswas, **G. Narayan**, I. Andreoni, P. S. Cowperthwaite, T. Ribeiro, W. t. S. o. t. LSST Transient, and Variable Stars Collaboration. *Publ. Astron. Soc. Pac.*, Jun 2019. 131(1000):p. 068002.

- [75] **Mapping the Interstellar Reddening and Extinction toward Baade's Window Using Minimum Light Colors of ab-type RR Lyrae Stars: Revelations from the De-reddened Color-Magnitude Diagrams.** A. Saha, A. K. Vivas, E. W. Olszewski, V. Smith, K. Olsen, R. Blum, F. Valdes, J. Claver, A. Calamida, A. R. Walker, T. Matheson, **G. Narayan**, M. Soraism, K. Cunha, T. Axelrod, J. S. Bloom, S. B. Cenko, B. Frye, M. Juric, C. Kaleida, A. Kunder, A. Miller, D. Nidever, and S. Ridgway. *Astrophys. J.*, Mar 2019. 874(1):30.
- [76] **K2 Observations of SN 2018oh Reveal a Two-component Rising Light Curve for a Type Ia Supernova.** G. Dimitriadis, R. J. Foley, A. Rest, D. Kasen, A. L. Piro, A. Polin, D. O. Jones, A. Villar, **G. Narayan**, D. A. Coulter, C. D. Kilpatrick, Y. C. Pan, C. Rojas-Bravo, O. D. Fox, S. W. Jha, P. E. Nugent, A. G. Riess, D. Scolnic, M. R. Drout, K2 Mission Team, G. Barentsen, J. Dotson, M. Gully-Santiago, C. Hedges, A. M. Cody, T. Barclay, S. Howell, KEGS, P. Garnavich, B. E. Tucker, E. Shaya, R. Mushotzky, R. P. Olling, S. Margheim, A. Zenteno, Kepler spacecraft Team, J. Coughlin, J. E. Van Cleve, J. V. d. M. Cardoso, K. A. Larson, K. M. McCalmont-Everton, C. A. Peterson, S. E. Ross, L. H. Reedy, D. Osborne, C. McGinn, L. Kohnert, L. Migliorini, A. Wheaton, B. Spencer, C. Labonde, G. Castillo, G. Beerman, K. Steward, M. Hanley, R. Larsen, R. Gangopadhyay, R. Kloetzel, T. Weschler, V. Nystrom, J. Moffatt, M. Redick, K. Griest, M. Packard, M. Muszynski, J. Kampmeier, R. Bjella, S. Flynn, B. Elsaesser, Pan-STARRS, K. C. Chambers, H. A. Flewelling, M. E. Huber, E. A. Magnier, C. Z. Waters, A. S. B. Schultz, J. Bulger, T. B. Lowe, M. Willman, S. J. Smartt, K. W. Smith, DECam, S. Points, G. M. Strampelli, ASAS-SN, J. Brimacombe, P. Chen, J. A. Muñoz, R. L. Mutel, J. Shields, P. J. Valley, J. Villanueva, S., PTSS/TNTS, W. Li, X. Wang, J. Zhang, H. Lin, J. Mo, X. Zhao, H. Sai, X. Zhang, K. Zhang, T. Zhang, L. Wang, J. Zhang, E. Baron, J. M. DerKacy, L. Li, Z. Chen, D. Xiang, L. Rui, L. Wang, F. Huang, X. Li, L. Cumbres Observatory, G. Hosseinzadeh, D. A. Howell, I. Arcavi, D. Hiramatsu, J. Burke, S. Valenti, ATLAS, J. L. Tonry, L. Denneau, A. N. Heinze, H. Weiland, B. Stalder, Konkoly, J. Vinkó, K. Sárneczky, A. Pál, A. Bódi, Z. Bognár, B. Csák, B. Cseh, G. Csörnyei, O. Hanyecz, B. Ignácz, C. Kalup, R. Könyves-Tóth, L. Kriskovics, A. Ordasi, I. Rajmon, A. Sódor, R. Szabó, R. Szakáts, G. Zsidi, ePESSTO, S. C. Williams, J. Nordin, R. Cartier, C. Frohmaier, L. Galbany, C. P. Gutiérrez, I. Hook, C. Inserra, M. Smith, U. o. Arizona, D. J. Sand, J. E. Andrews, N. Smith, and C. Bilinski. *Astrophys. J.*, Jan 2019. 870(1):L1.
- [77] **Photometric and Spectroscopic Properties of Type Ia Supernova 2018oh with Early Excess Emission from the Kepler 2 Observations.** W. Li, X. Wang, J. Vinkó, J. Mo, G. Hosseinzadeh, D. J. Sand, J. Zhang, H. Lin, PTSS/TNTS, T. Zhang, L. Wang, J. Zhang, Z. Chen, D. Xiang, L. Rui, F. Huang, X. Li, X. Zhang, L. Li, E. Baron, J. M. Derkacy, X. Zhao, H. Sai, K. Zhang, L. Wang, LCO, D. A. Howell, C. McCully, I. Arcavi, S. Valenti, D. Hiramatsu, J. Burke, KEGS, A. Rest, P. Garnavich, B. E. Tucker, **G. Narayan**, E. Shaya, S. Margheim, A. Zenteno, A. Villar, UCSC, G. Dimitriadis, R. J. Foley, Y. C. Pan, D. A. Coulter, O. D. Fox, S. W. Jha, D. O. Jones, D. N. Kasen, C. D. Kilpatrick, A. L. Piro, A. G. Riess, C. Rojas-Bravo, ASAS-SN, B. J. Shappee, T. W. S. Holoién, K. Z. Stanek, M. R. Drout, K. Auchettl, C. S. Kochanek, J. S. Brown, S. Bose, D. Bersier, J. Brimacombe, P. Chen, S. Dong, S. Holmbo, J. A. Muñoz, R. L. Mutel, R. S. Post, J. L. Prieto, J. Shields, D. Tallon, T. A. Thompson, P. J. Valley, J. Villanueva, S., Pan-STARRS, S. J. Smartt, K. W. Smith, K. C. Chambers, H. A. Flewelling, M. E. Huber, E. A. Magnier, C. Z. Waters, A. S. B. Schultz, J. Bulger, T. B. Lowe, M. Willman, Konkoly/Texas, K. Sárneczky, A. Pál, J. C. Wheeler, A. Bódi, Z. Bognár, B. Csák, B. Cseh, G. Csörnyei, O. Hanyecz, B. Ignácz, C. Kalup, R. Könyves-Tóth, L. Kriskovics, A. Ordasi, I. Rajmon, A. Sódor, R. Szabó, R. Szakáts, G. Zsidi, U. o. Arizona, P. Milne, J. E. Andrews, N. Smith, C. Bilinski, Swift, P. J. Brown, ePESSTO, J. Nordin, S. C. Williams, L. Galbany, J. Palmerio, I. M. Hook, C. Inserra, K. Maguire, R. Cartier, A. Razza, C. P. Gutiérrez, U. o. North Carolina, J. J. Hermes, L. S. Reding, B. C. Kaiser, ATLAS, J. L. Tonry, A. N. Heinze, L. Denneau, H. Weiland, B. Stalder, K2 Mission Team, G. Barentsen, J. Dotson, T. Barclay, M. Gully-Santiago, C. Hedges, A. M. Cody, S. Howell, Kepler Spacecraft Team, J. Coughlin, J. E. Van Cleve, J. V. d. M. Cardoso, K. A. Larson, K. M. McCalmont-Everton, C. A. Peterson, S. E. Ross, L. H. Reedy, D. Osborne, C. McGinn, L. Kohnert, L. Migliorini, A. Wheaton, B. Spencer, C. Labonde, G. Castillo, G. Beerman, K. Steward, M. Hanley, R. Larsen, R. Gangopadhyay, R. Kloetzel, T. Weschler, V. Nystrom, J. Moffatt, M. Redick, K. Griest, M. Packard, M. Muszynski, J. Kampmeier, R. Bjella, S. Flynn, and B. Elsaesser. *Astrophys. J.*, Jan 2019. 870(1):12.
- [78] **Seeing Double: ASASSN-18bt Exhibits a Two-component Rise in the Early-time K2 Light Curve.** B. J. Shappee, T. W. S. Holoién, M. R. Drout, K. Auchettl, M. D. Stritzinger, C. S. Kochanek, K. Z. Stanek, E. Shaya, **G. Narayan**, ASAS-SN, J. S. Brown, S. Bose, D. Bersier, J. Brimacombe, P. Chen, S. Dong, S. Holmbo, B. Katz, J. A. Muñoz, R. L. Mutel, R. S. Post, J. L. Prieto, J. Shields, D. Tallon, T. A. Thompson, P. J. Valley, J. Villanueva, S., ATLAS, L. Denneau, H. Flewelling, A. N. Heinze, K. W. Smith, B. Stalder, J. L. Tonry, H. Weiland, Kepler/K2, T. Barclay, G. Barentsen, A. M. Cody, J. Dotson, F. Foerster, P. Garnavich, M. Gully-Santiago, C. Hedges, S. Howell, D. Kasen, S. Margheim, R. Mushotzky, A. Rest, B. E. Tucker, A. Villar, A. Zenteno, Kepler Spacecraft Team, G. Beerman, R. Bjella, G. Castillo, J. Coughlin, B. Elsaesser, S. Flynn, R. Gangopadhyay, K. Griest, M. Hanley, J. Kampmeier, R. Kloetzel, L. Kohnert, C. Labonde, R. Larsen, K. A. Larson, K. M. McCalmont-Everton, C. McGinn, L. Migliorini, J. Moffatt, M. Muszynski, V. Nystrom, D. Osborne, M. Packard, C. A. Peterson, M. Redick, L. H. Reedy, S. E. Ross, B. Spencer, K. Steward, J. E. Van Cleve, J. V. d. M. Cardoso, T. Weschler, A. Wheaton, Pan-STARRS, J. Bulger, K. C. Chambers, H. A. Flewelling, M. E. Huber, T. B. Lowe, E. A. Magnier, A. S. B. Schultz, C. Z. Waters, M. Willman, PTSS/TNTS, E. Baron, Z. Chen, J. M. Derkacy, F. Huang, L. Li, W. Li, X. Li, J. Mo, L. Rui, H. Sai, L. Wang, L. Wang, X. Wang, D. Xiang, J. Zhang, J. Zhang, K. Zhang, T. Zhang, X. Zhao, P. J. Brown, J. J. Hermes, J. Nordin, S. Points, A. Sódor, G. M. Strampelli, and A. Zenteno. *Astrophys. J.*, Jan 2019. 870(1):13.
- [79] **Extending Supernova Spectral Templates for Next-generation Space Telescope Observations.** J. D. R. Pierel, S. Rodney, A. Avelino, F. Bianco, A. V. Filippenko, R. J. Foley, A. Friedman, M. Hicken, R. Hounsell, S. W. Jha, R. Kessler, R. P. Kirshner, K. Mandel, **G. Narayan**, D. Scolnic, and L. Strolger. *Publ. Astron. Soc. Pac.*, Nov. 2018. 130(11):p. 114504.
- [80] **The Photometric LSST Astronomical Time-series Classification Challenge PLAsTiCC: Selection of a Performance Metric for Classification Probabilities Balancing Diverse Science Goals.** A. I. Malz, R. Hložek, J. Allam, T., A. Bahmanyar, R. Biswas, M. Dai, L. Galbany, E. E. O. Ishida, S. W. Jha, D. O. Jones, R. Kessler, M. Lochner, A. A. Mahabal, K. S. Mandel, J. R. Martínez-Galarza, J. D. McEwen, D. Muthukrishna, **G. Narayan**, H. Peiris, C. M. Peters, K. Ponder, C. N. Setzer, (the LSST Dark Energy Science Collaboration, t. LSST Transients, and Variable Stars Science Collaboration. *Astronomical J.*, Nov. 2019. 158(5):171.
- [81] **MOSFiT: Modular Open Source Fitter for Transients.** J. Guillochon, M. Nicholl, V. A. Villar, B. Mockler, **G. Narayan**, K. S. Mandel, E. Berger, and P. K. G. Williams. *Astrophys. J. Suppl. Ser.*, May 2018. 236:6.

- [82] **Overview of the DESI Legacy Imaging Surveys.** A. Dey, D. J. Schlegel, D. Lang, R. Blum, K. Burleigh, X. Fan, J. R. Findlay, D. Finkbeiner, D. Herrera, S. Juneau, M. Landriau, M. Levi, I. McGreer, A. Meisner, A. D. Myers, J. Moustakas, P. Nugent, A. Patej, E. F. Schlafly, A. R. Walker, F. Valdes, B. A. Weaver, C. Yèche, H. Zou, X. Zhou, B. Abareshi, T. M. C. Abbott, B. Abolfathi, C. Aguilera, S. Alam, L. Allen, A. Alvarez, J. Annis, B. Ansarinejad, M. Aubert, J. Beechert, E. F. Bell, S. Y. BenZvi, F. Beutler, R. M. Bielby, A. S. Bolton, C. Briceño, E. J. Buckley-Geer, K. Butler, A. Calamida, R. G. Carlberg, P. Carter, R. Casas, F. J. Castander, Y. Choi, J. Comparat, E. Cukanovaite, T. Delubac, K. DeVries, S. Dey, G. Dhungana, M. Dickinson, Z. Ding, J. B. Donaldson, Y. Duan, C. J. Duckworth, S. Eftekharzadeh, D. J. Eisenstein, T. Etourneau, P. A. Agrelius, J. Farihi, M. Fitzpatrick, A. Font-Ribera, L. Fulmer, B. T. Gänsicke, E. Gaztanaga, K. George, D. W. Gerdes, S. G. A. Gontcho, C. Gorgoni, G. Green, J. Guy, D. Harmer, M. Hernandez, K. Honscheid, L. W. Huang, D. J. James, B. T. Jannuzi, L. Jiang, R. Joyce, A. Karcher, S. Karkar, R. Kehoe, J.-P. Kneib, A. Kueter-Young, T.-W. Lan, T. R. Lauer, L. Le Guillou, A. Le Van Suu, J. H. Lee, M. Lesser, L. Perreault Levasseur, T. S. Li, J. L. Mann, R. Marshall, C. E. Martínez-Vázquez, P. Martini, H. du Mas des Bourboux, S. McManus, T. G. Meier, B. Ménard, N. Metcalfe, A. Muñoz-Gutiérrez, J. Najita, K. Napier, **G. Narayan**, J. A. Newman, J. Nie, B. Nord, D. J. Norman, K. A. G. Olsen, A. Paat, N. Palanque-Delabrouille, X. Peng, C. L. Poppett, M. R. Poremba, A. Prakash, D. Rabinowitz, A. Raichoor, M. Rezaie, A. N. Robertson, N. A. Roe, A. J. Ross, N. P. Ross, G. Rudnick, S. Safonova, A. Saha, F. J. Sánchez, E. Savary, H. Schweiker, A. Scott, H.-J. Seo, H. Shan, D. R. Silva, Z. Slepian, C. Soto, D. Sprayberry, R. Staten, C. M. Stillman, R. J. Stupak, D. L. Summers, S. Sien Tie, H. Tirado, M. Vargas-Magaña, A. K. Vivas, R. H. Wechsler, D. Williams, J. Yang, Q. Yang, T. Yápicí, D. Zaritsky, A. Zenteno, K. Zhang, T. Zhang, R. Zhou, and Z. Zhou. *Astronomical J.*, May 2019. 157(5):168.
- [83] **Absolute Magnitudes and Colors of RR Lyrae Stars in DECam Passbands from Photometry of the Globular Cluster M5.** A. K. Vivas, A. Saha, K. Olsen, R. Blum, E. W. Olszewski, J. Claver, F. Valdes, T. Axelrod, C. Kaleida, A. Kunder, **G. Narayan**, T. Matheson, and A. Walker. *Astronomical J.*, Sep. 2017. 154:85.
- [84] **The GALEX Time Domain Survey. II. Wavelength-Dependent Variability of Active Galactic Nuclei in the Pan-STARRS1 Medium Deep Survey.** T. Hung, S. Gezari, D. O. Jones, R. P. Kirshner, R. Chornock, E. Berger, A. Rest, M. Huber, **G. Narayan**, D. Scolnic, C. Waters, R. Wainscoat, D. C. Martin, K. Forster, and J. D. Neill. *Astrophys. Journal*, Dec. 2016. 833:226.
- [85] **CfAIR2: Near-infrared Light Curves of 94 Type Ia Supernovae.** A. S. Friedman, W. M. Wood-Vasey, G. H. Marion, P. Challis, K. S. Mandel, J. S. Bloom, M. Modjaz, **G. Narayan**, M. Hicken, R. J. Foley, C. R. Klein, D. L. Starr, A. Morgan, A. Rest, C. H. Blake, A. A. Miller, E. E. Falco, W. F. Wyatt, J. Mink, M. F. Skrutskie, and R. P. Kirshner. *Astrophys. J. Suppl. Ser.*, Sep. 2015. 220:9.
- [86] **PSI-10jh Continues to Follow the fallback Accretion Rate of a Tidally Disrupted Star.** S. Gezari, R. Chornock, A. Lawrence, A. Rest, D. O. Jones, E. Berger, P. M. Challis, and **G. Narayan**. *Astrophys. J. Lett.*, Dec. 2015. 815:L5.
- [87] **The Changing Fractions of Type Ia Supernova NUV–Optical Subclasses with Redshift.** P. A. Milne, R. J. Foley, P. J. Brown, and **G. Narayan**. *Astrophys. J.*, Apr. 2015. 803:20.
- [88] **Toward Characterization of the Type IIP Supernova Progenitor Population: A Statistical Sample of Light Curves from Pan-STARRS1.** N. E. Sanders, A. M. Soderberg, S. Gezari, M. Betancourt, R. Chornock, E. Berger, R. J. Foley, P. Challis, M. Drout, R. P. Kirshner, R. Lunnan, G. H. Marion, R. Margutti, R. McKinnon, D. Milisavljevic, **G. Narayan**, A. Rest, E. Kankare, S. Mattila, S. J. Smartt, M. E. Huber, W. S. Burgett, P. W. Draper, K. W. Hodapp, N. Kaiser, R. P. Kudritzki, E. A. Magnier, N. Metcalfe, J. S. Morgan, P. A. Price, J. L. Tonry, R. J. Wainscoat, and C. Waters. *Astrophys. J.*, Feb. 2015. 799:208.
- [89] **Zooming In on the Progenitors of Superluminous Supernovae With the HST.** R. Lunnan, R. Chornock, E. Berger, A. Rest, W. Fong, D. Scolnic, D. O. Jones, A. M. Soderberg, P. M. Challis, M. R. Drout, R. J. Foley, M. E. Huber, R. P. Kirshner, C. Leibler, G. H. Marion, M. McCrum, D. Milisavljevic, **G. Narayan**, N. E. Sanders, S. J. Smartt, K. W. Smith, J. L. Tonry, W. S. Burgett, K. C. Chambers, H. Flewelling, R.-P. Kudritzki, R. J. Wainscoat, and C. Waters. *Astrophys. J.*, May 2015. 804:90.
- [90] **Selection of Burst-like Transients and Stochastic Variables Using Multi-band Image Differencing in the Pan-STARRS1 Medium-deep Survey.** S. Kumar, S. Gezari, S. Heinis, R. Chornock, E. Berger, A. Rest, M. E. Huber, R. J. Foley, **G. Narayan**, G. H. Marion, D. Scolnic, A. Soderberg, A. Lawrence, C. W. Stubbs, R. P. Kirshner, A. G. Riess, S. J. Smartt, K. Smith, W. M. Wood-Vasey, W. S. Burgett, K. C. Chambers, H. Flewelling, N. Kaiser, N. Metcalfe, P. A. Price, J. L. Tonry, and R. J. Wainscoat. *Astrophys. J.*, Mar. 2015. 802:27.
- [91] **Possible Detection of the Stellar Donor or Remnant for the Type Ia Supernova 2008ha.** R. J. Foley, C. McCully, S. W. Jha, L. Bildsten, W.-f. Fong, **G. Narayan**, A. Rest, and M. D. Stritzinger. *Astrophys. J.*, Sep. 2014. 792:29.
- [92] **Rapidly Evolving and Luminous Transients from Pan-STARRS1.** M. R. Drout, R. Chornock, A. M. Soderberg, N. E. Sanders, R. McKinnon, A. Rest, R. J. Foley, D. Milisavljevic, R. Margutti, E. Berger, M. Calkins, W. Fong, S. Gezari, M. E. Huber, E. Kankare, R. P. Kirshner, C. Leibler, R. Lunnan, S. Mattila, G. H. Marion, **G. Narayan**, A. G. Riess, K. C. Roth, D. Scolnic, S. J. Smartt, J. L. Tonry, W. S. Burgett, K. C. Chambers, K. W. Hodapp, R. Jedicke, N. Kaiser, E. A. Magnier, N. Metcalfe, J. S. Morgan, P. A. Price, and C. Waters. *Astrophys. J.*, Oct. 2014. 794:23.
- [93] **Hydrogen-poor Superluminous Supernovae and Long-duration Gamma-Ray Bursts Have Similar Host Galaxies.** R. Lunnan, R. Chornock, E. Berger, T. Laskar, W. Fong, A. Rest, N. E. Sanders, P. M. Challis, M. R. Drout, R. J. Foley, M. E. Huber, R. P. Kirshner, C. Leibler, G. H. Marion, M. McCrum, D. Milisavljevic, **G. Narayan**, D. Scolnic, S. J. Smartt, K. W. Smith, A. M. Soderberg, J. L. Tonry, W. S. Burgett, K. C. Chambers, H. Flewelling, K. W. Hodapp, N. Kaiser, E. A. Magnier, P. A. Price, and R. J. Wainscoat. *Astrophys. J.*, Jun. 2014. 787:138.
- [94] **The Ultraviolet-bright, Slowly Declining Transient PSI-11af as a Partial Tidal Disruption Event.** R. Chornock, E. Berger, S. Gezari, B. A. Zauderer, A. Rest, L. Chomiuk, A. Kamble, A. M. Soderberg, I. Czekala, J. Dittmann, M. Drout, R. J. Foley, W. Fong, M. E. Huber, R. P. Kirshner, A. Lawrence, R. Lunnan, G. H. Marion, **G. Narayan**, A. G. Riess, K. C. Roth, N. E. Sanders, D. Scolnic, S. J. Smartt, K. Smith, C. W. Stubbs, J. L. Tonry, W. S. Burgett, K. C. Chambers, H. Flewelling, K. W. Hodapp, N. Kaiser, E. A. Magnier, D. C. Martin, J. D. Neill, P. A. Price, and R. Wainscoat. *Astrophys. J.*, Jan. 2014. 780:44.



- [95] **Slowly fading super-luminous supernovae that are not pair-instability explosions.** M. Nicholl, S. J. Smartt, A. Jerkstrand, C. Inserra, M. McCrum, R. Kotak, M. Fraser, D. Wright, T.-W. Chen, K. Smith, D. R. Young, S. A. Sim, S. Valenti, D. A. Howell, F. Bresolin, R. P. Kudritzki, J. L. Tonry, M. E. Huber, A. Rest, A. Pastorello, L. Tomasella, E. Cappellaro, S. Benetti, S. Mattila, E. Kankare, T. Kangas, G. Leloudas, J. Sollerman, F. Taddia, E. Berger, R. Chornock, **G. Narayan**, C. W. Stubbs, R. J. Foley, R. Lunnan, A. Soderberg, N. Sanders, D. Milisavljevic, R. Margutti, R. P. Kirshner, N. Elias-Rosa, A. Morales-Garoffolo, S. Taubenberger, M. T. Botticella, S. Gezari, Y. Urata, S. Rodney, A. G. Riess, D. Scolnic, W. M. Wood-Vasey, W. S. Burgett, K. Chambers, H. A. Flewelling, E. A. Magnier, N. Kaiser, N. Metcalfe, J. Morgan, P. A. Price, W. Sweeney, and C. Waters. *Nature*, Oct. 2013. 502:pp. 346–349.
- [96] **PSI-10afx at  $z = 1.388$ : Pan-STARRS1 Discovery of a New Type of Superluminous Supernova.** R. Chornock, E. Berger, A. Rest, D. Milisavljevic, R. Lunnan, R. J. Foley, A. M. Soderberg, S. J. Smartt, A. J. Burgasser, P. Challis, L. Chomiuk, I. Czekala, M. Drout, W. Fong, M. E. Huber, R. P. Kirshner, C. Leibler, B. McLeod, G. H. Marion, **G. Narayan**, A. G. Riess, K. C. Roth, N. E. Sanders, D. Scolnic, K. Smith, C. W. Stubbs, J. L. Tonry, S. Valenti, W. S. Burgett, K. C. Chambers, K. W. Hodapp, N. Kaiser, R.-P. Kudritzki, E. A. Magnier, and P. A. Price. *Astrophys. J.*, Apr. 2013. 767:162.
- [97] **PSI-10bzj: A Fast, Hydrogen-poor Superluminous Supernova in a Metal-poor Host Galaxy.** R. Lunnan, R. Chornock, E. Berger, D. Milisavljevic, M. Drout, N. E. Sanders, P. M. Challis, I. Czekala, R. J. Foley, W. Fong, M. E. Huber, R. P. Kirshner, C. Leibler, G. H. Marion, M. McCrum, **G. Narayan**, A. Rest, K. C. Roth, D. Scolnic, S. J. Smartt, K. Smith, A. M. Soderberg, C. W. Stubbs, J. L. Tonry, W. S. Burgett, K. C. Chambers, R.-P. Kudritzki, E. A. Magnier, and P. A. Price. *Astrophys. J. Lett.*, Jul. 2013. 771:97.
- [98] **SN 2010ay is a Luminous and Broad-lined Type Ic Supernova within a Low-metallicity Host Galaxy.** N. E. Sanders, A. M. Soderberg, S. Valenti, R. J. Foley, R. Chornock, L. Chomiuk, E. Berger, S. Smartt, K. Hurley, S. D. Barthelmy, E. M. Levesque, **G. Narayan**, M. T. Botticella, M. S. Briggs, V. Connaughton, Y. Terada, N. Gehrels, S. Golenetskii, E. Mazets, T. Cline, A. von Kienlin, W. Boynton, K. C. Chambers, T. Grav, J. N. Heasley, K. W. Hodapp, R. Jedicke, N. Kaiser, R. P. Kirshner, R.-P. Kudritzki, G. A. Luppino, R. H. Lupton, E. A. Magnier, D. G. Monet, J. S. Morgan, P. M. Onaka, P. A. Price, C. W. Stubbs, J. L. Tonry, R. J. Wainscoat, and M. F. Waterson. *Astrophys. J.*, Sep. 2012. 756:184.
- [99] **Ultraluminous Supernovae as a New Probe of the Interstellar Medium in Distant Galaxies.** E. Berger, R. Chornock, R. Lunnan, R. Foley, I. Czekala, A. Rest, C. Leibler, A. M. Soderberg, K. Roth, **G. Narayan**, M. E. Huber, D. Milisavljevic, N. E. Sanders, M. Drout, R. Margutti, R. P. Kirshner, G. H. Marion, P. J. Challis, A. G. Riess, S. J. Smartt, W. S. Burgett, K. W. Hodapp, J. N. Heasley, N. Kaiser, R.-P. Kudritzki, E. A. Magnier, M. McCrum, P. A. Price, K. Smith, J. L. Tonry, and R. J. Wainscoat. *Astrophys. J. Lett.*, Aug. 2012. 755:L29.
- [100] **CfA4: Light Curves for 94 Type Ia Supernovae.** M. Hicken, P. Challis, R. P. Kirshner, A. Rest, C. E. Cramer, W. M. Wood-Vasey, G. Bakos, P. Berlind, W. R. Brown, N. Caldwell, M. Calkins, T. Currie, K. de Kleer, G. Esquerdo, M. Everett, E. Falco, J. Fernandez, A. S. Friedman, T. Groner, J. Hartman, M. J. Holman, R. Hutchins, S. Keys, D. Kipping, D. Latham, G. H. Marion, **G. Narayan**, M. Pahre, A. Pal, W. Peters, G. Perumpilly, B. Ripman, B. Sipocz, A. Szentgyorgyi, S. Tang, M. A. P. Torres, A. Vaz, S. Wolk, and A. Zezas. *Astrophys. J. Suppl. Ser.*, Jun. 2012. 200:12.
- [101] **An ultraviolet-optical flare from the tidal disruption of a helium-rich stellar core.** S. Gezari, R. Chornock, A. Rest, M. E. Huber, K. Forster, E. Berger, P. J. Challis, J. D. Neill, D. C. Martin, T. Heckman, A. Lawrence, C. Norman, **G. Narayan**, R. J. Foley, G. H. Marion, D. Scolnic, L. Chomiuk, A. Soderberg, K. Smith, R. P. Kirshner, A. G. Riess, S. J. Smartt, C. W. Stubbs, J. L. Tonry, W. M. Wood-Vasey, W. S. Burgett, K. C. Chambers, T. Grav, J. N. Heasley, N. Kaiser, R.-P. Kudritzki, E. A. Magnier, J. S. Morgan, and P. A. Price. *Nature*, May 2012. 485:pp. 217–220.
- [102] **Pan-STARRS1 Discovery of Two Ultraluminous Supernovae at  $z \sim 0.9$ .** L. Chomiuk, R. Chornock, A. M. Soderberg, E. Berger, R. A. Chevalier, R. J. Foley, M. E. Huber, **G. Narayan**, A. Rest, S. Gezari, R. P. Kirshner, A. Riess, S. A. Rodney, S. J. Smartt, C. W. Stubbs, J. L. Tonry, W. M. Wood-Vasey, W. S. Burgett, K. C. Chambers, I. Czekala, H. Flewelling, K. Forster, N. Kaiser, R.-P. Kudritzki, E. A. Magnier, D. C. Martin, J. S. Morgan, J. D. Neill, P. A. Price, K. C. Roth, N. E. Sanders, and R. J. Wainscoat. *Astrophys. J.*, Dec. 2011. 743:114.
- [103] **Direct Confirmation of the Asymmetry of the Cas A Supernova with Light Echoes.** A. Rest, R. J. Foley, B. Sinnott, D. L. Welch, C. Badenes, A. V. Filippenko, M. Bergmann, W. A. Bhatti, S. Blondin, P. Challis, G. Damke, H. Finley, M. E. Huber, D. Kasen, R. P. Kirshner, T. Matheson, P. Mazzali, D. Minniti, R. Nakajima, **G. Narayan**, K. Olsen, D. Sauer, R. C. Smith, and N. B. Suntzeff. *Astrophys. J.*, May 2011. 732:3.
- [104] **On the Interpretation of Supernova Light Echo Profiles and Spectra.** A. Rest, B. Sinnott, D. L. Welch, R. J. Foley, **G. Narayan**, K. Mandel, M. E. Huber, and S. Blondin. *Astrophys. J.*, May 2011. 732:2.
- [105] **Precise Throughput Determination of the PanSTARRS Telescope and the Gigapixel Imager Using a Calibrated Silicon Photodiode and a Tunable Laser: Initial Results.** C. W. Stubbs, P. Doherty, C. Cramer, **G. Narayan**, Y. J. Brown, K. R. Lykke, J. T. Woodward, and J. L. Tonry. *Astrophys. J. Suppl. Ser.*, Dec. 2010. 191:pp. 376–388.
- [106] **Supernova 2009kf: An Ultraviolet Bright Type IIP Supernova Discovered with Pan-STARRS 1 and GALEX.** M. T. Botticella, C. Trundle, A. Pastorello, S. Rodney, A. Rest, S. Gezari, S. J. Smartt, **G. Narayan**, M. E. Huber, J. L. Tonry, D. Young, K. Smith, F. Bresolin, S. Valenti, R. Kotak, S. Mattila, E. Kankare, W. M. Wood-Vasey, A. Riess, J. D. Neill, K. Forster, D. C. Martin, C. W. Stubbs, W. S. Burgett, K. C. Chambers, T. Dombeck, H. Flewelling, T. Grav, J. N. Heasley, K. W. Hodapp, N. Kaiser, R. Kudritzki, G. Luppino, R. H. Lupton, E. A. Magnier, D. G. Monet, J. S. Morgan, P. M. Onaka, P. A. Price, P. H. Rhoads, W. A. Siegmund, W. E. Sweeney, R. J. Wainscoat, C. Waters, M. F. Waterson, and C. G. Wynn-Williams. *Astrophys. J. Lett.*, Jul. 2010. 717:pp. L52–L56.

- [107] **CfA3: 185 Type Ia Supernova Light Curves from the CfA.** M. Hicken, P. Challis, S. Jha, R. P. Kirshner, T. Matheson, M. Modjaz, A. Rest, W. M. Wood-Vasey, G. Bakos, E. J. Barton, P. Berlind, A. Bragg, C. Briceño, W. R. Brown, N. Caldwell, M. Calkins, R. Cho, L. Ciupik, M. Contreras, K.-C. Dendy, A. Dosaj, N. Durham, K. Eriksen, G. Esquerdo, M. Everett, E. Falco, J. Fernandez, A. Gaba, P. Garnavich, G. Graves, P. Green, T. Groner, C. Hergenrother, M. J. Holman, V. Hradecky, J. Huchra, B. Hutchison, D. Jerius, A. Jordan, R. Kilgard, M. Krauss, K. Luhman, L. Macri, D. Marrone, J. McDowell, D. McIntosh, B. McNamara, T. Megeath, B. Mochejska, D. Munoz, J. Muzerolle, O. Naranjo, **G. Narayan**, M. Pahre, W. Peters, D. Peterson, K. Rines, B. Ripman, A. Roussanova, R. Schild, A. Sicilia-Aguilar, J. Sokoloski, K. Smalley, A. Smith, T. Spahr, K. Z. Stanek, P. Barmby, S. Blondin, C. W. Stubbs, A. Szentgyorgyi, M. A. P. Torres, A. Vaz, A. Vikhlinin, Z. Wang, M. Westover, D. Woods, and P. Zhao. *Astrophys. J.*, Jul. 2009. 700:pp. 331–357.
- [108] **Time Dilation in Type Ia Supernova Spectra at High Redshift.** S. Blondin, T. M. Davis, K. Krisciunas, B. P. Schmidt, J. Sollerman, W. M. Wood-Vasey, A. C. Becker, P. Challis, A. Clocchiatti, G. Damke, A. V. Filippenko, R. J. Foley, P. M. Garnavich, S. W. Jha, R. P. Kirshner, B. Leibundgut, W. Li, T. Matheson, G. Miknaitis, **G. Narayan**, G. Pignata, A. Rest, A. G. Riess, J. M. Silverman, R. C. Smith, J. Spyromilio, M. Stritzinger, C. W. Stubbs, N. B. Suntzeff, J. L. Tonry, B. E. Tucker, and A. Zenteno. *Astrophys. J.*, Aug. 2008. 682:pp. 724–736.
- [109] **Exploring the Outer Solar System with the ESSENCE Supernova Survey.** A. C. Becker, K. Arraki, N. A. Kaib, W. M. Wood-Vasey, C. Aguilera, J. W. Blackman, S. Blondin, P. Challis, A. Clocchiatti, R. Covarrubias, G. Damke, T. M. Davis, A. V. Filippenko, R. J. Foley, A. Garg, P. M. Garnavich, M. Hicken, S. Jha, R. P. Kirshner, K. Krisciunas, B. Leibundgut, W. Li, T. Matheson, A. Miceli, G. Miknaitis, **G. Narayan**, G. Pignata, J. L. Prieto, A. Rest, A. G. Riess, M. E. Salvo, B. P. Schmidt, R. C. Smith, J. Sollerman, J. Spyromilio, C. W. Stubbs, N. B. Suntzeff, J. L. Tonry, and A. Zenteno. *Astrophys. J. Lett.*, Jul. 2008. 682:pp. L53–L56.
- [110] **Observational Constraints on the Nature of Dark Energy: First Cosmological Results from the ESSENCE Supernova Survey.** W. M. Wood-Vasey, G. Miknaitis, C. W. Stubbs, S. Jha, A. G. Riess, P. M. Garnavich, R. P. Kirshner, C. Aguilera, A. C. Becker, J. W. Blackman, S. Blondin, P. Challis, A. Clocchiatti, A. Conley, R. Covarrubias, T. M. Davis, A. V. Filippenko, R. J. Foley, A. Garg, M. Hicken, K. Krisciunas, B. Leibundgut, W. Li, T. Matheson, A. Miceli, **G. Narayan**, G. Pignata, J. L. Prieto, A. Rest, M. E. Salvo, B. P. Schmidt, R. C. Smith, J. Sollerman, J. Spyromilio, J. L. Tonry, N. B. Suntzeff, and A. Zenteno. *Astrophys. J.*, Sep. 2007. 666:pp. 694–715.
- [111] **The ESSENCE Supernova Survey: Survey Optimization, Observations, and Supernova Photometry.** G. Miknaitis, G. Pignata, A. Rest, W. M. Wood-Vasey, S. Blondin, P. Challis, R. C. Smith, C. W. Stubbs, N. B. Suntzeff, R. J. Foley, T. Matheson, J. L. Tonry, C. Aguilera, J. W. Blackman, A. C. Becker, A. Clocchiatti, R. Covarrubias, T. M. Davis, A. V. Filippenko, A. Garg, P. M. Garnavich, M. Hicken, S. Jha, K. Krisciunas, R. P. Kirshner, B. Leibundgut, W. Li, A. Miceli, **G. Narayan**, J. L. Prieto, A. G. Riess, M. E. Salvo, B. P. Schmidt, J. Sollerman, J. Spyromilio, and A. Zenteno. *Astrophys. J.*, Sep. 2007. 666:pp. 674–693.
- [112] **Physical characteristics of Comet Nucleus C/2001 OG<sub>108</sub> (LONEOS).** P. A. Abell, Y. R. Fernández, P. Pravec, L. M. French, T. L. Farnham, M. J. Gaffey, P. S. Hardsen, P. Kušnirák, L. Šarounová, S. S. Sheppard, and **G. Narayan**. *Icarus*, Dec. 2005. 179:pp. 174–194.