List of Publications

Bastien Carreres

Publications

Publications as first author

1. **Carreres** et al. 2025. *Type Ia Supernova Growth-rate Measurement with LSST Simulations: Intrinsic Scatter Systematics*
   Published in The Astrophysical Journal. DOI: 10.3847/1538-4357/ae11ac
   In this paper, I study the impact of intrinsic scatter of SNe Ia on the measurement of $f\sigma_8$. This study is done through the simulation of the full low-z LSST SNe Ia sample for different intrinsic scatter models. We found that the most realistic model of intrinsic scatter causes non-Gaussianities in the Hubble diagram residuals, resulting in a bias on $f\sigma_8$.

2. **Carreres** et al. 2025. *ZTF SN Ia DR2: Peculiar velocities' impact on the Hubble diagram*
   Published in Astronomy & Astrophysics. DOI: 10.1051/0004-6361/202450389
   This paper is part of the second data release of ZTF SNe Ia. In this paper, I study the impact of the peculiar velocity (PV) systematics on the Hubble diagram of the ZTF SN Ia DR2 sample. We show that not taking into account the full PV covariance matrix can lead to a slight underestimation of the error on the Hubble constant H_0 and could shift its value by $\sim 1\ \mathrm{km\ s^{-1}}$.

3. **Carreres** et al. 2023. *Growth-rate measurement with type-Ia supernovae using ZTF survey simulations*
   Published in Astronomy & Astrophysics. DOI: 10.1051/0004-6361/202346173
   This paper is the main publication of my thesis. In this paper, I present my work to prepare for the future measurement of the growth rate of structure ($f\sigma_8$) from ZTF SN Ia data. I describe my realistic simulation of the ZTF SN Ia sample and, using these simulations, I study the biases and systematics that can affect the measurement of $f\sigma_8$. I show that using SN Ia data from the full 6 years of the ZTF II sample with a cut at a redshift of $z < 0.06$ to avoid selection due to magnitude limit, we can expect an unbiased measurement of $f\sigma_8$ with an error of $\sim 19\%$.

Publications with significant contribution

1. Acevedo, Sherman, Brout, **Carreres** et al. 2025. *The Dark Energy Bedrock All-Sky Supernova Program: Cross Calibration, Simulations, and Cosmology Forecasts*
   Accepted for publication by The Astrophysical Journal. DOI: 10.48550/arXiv.2508.10877
   This publication introduces the Dark Energy Bedrock All-Sky Supernova (DEBASS) low-z survey. The paper gives an overview of the survey, examines systematic such as photometric calibration and selection effects, presents simulations, and provides forecasts for future cosmological analysis. I was actively involved in the simulation and forecast sections, and in the writing process

2. Rosselli, **Carreres** et al. 2025. *Forecast for growth-rate measurement using peculiar velocities from LSST supernovae*
   Published in Astronomy & Astrophysics. DOI: 10.1051/0004-6361/202556181
   This paper presents a simulation-based forecast for the measurement of the growth rate of structure ($f\sigma_8$) with the Rubin-LSST survey. It shows that the full constraining power of the Rubin-LSST SNe Ia sample will enable a constraint at the $\sim 10\%$ level in the redshift range $0.02 < z < 0.14$. I participated in the development of the simulation and analysis code used in this publication. I was also involved in the writing and review process.

3. Ravoux, **Carreres** et al. 2025. *Generalized framework for likelihood-based field-level inference of growth rate from velocity and density fields*
   Published in Astronomy & Astrophysics. DOI: 10.1051/0004-6361/202554319
   This paper presents the FLIP Python library. This library is based on codes developed during my PhD and

proposes a more general framework for the constraint of the growth rate of structure. I actively participated in the development of FLIP and in the writing of this paper.

4. Peterson, **Carreres** et al. 2025. *Improving the Determination of Supernova Cosmological Redshifts by Using Galaxy Groups*
   Published in The Astrophysical Journal. DOI: `10.3847/1538-4357/ada285`
   In this paper, we used SNe Ia data and the Uchuu UniverseMachine simulation to study the improvement on the SNe Ia Hubble diagram that we can expect from averaging redshift over galaxy groups of SN Ia hosts. I ran the simulations and was actively involved in the analysis.

Publications as co-author

1. Lacroix, Regnault, Jaeger, Jeune, Betoule, Colley, Bernard, Rigault, Smith, Goobar, Maguire, Dimitriadis, Nordin, Johansson, Aubert, Barjou, Bellm, Bongard, Burgaz, **Carreres** et al. 2025. *ZTF SNe Ia DR2: Towards cosmology-grade ZTF supernova light curves using scene modeling photometry*
   Pre-published on arXiv. DOI: `10.48550/arXiv.2509.04073`

2. Ginolin, Rigault, Smith, Copin, Ruppin, Dimitriadis, Goobar, Johansson, Maguire, Nordin, Amenouche, Aubert, Barjou-Delayre, Betoule, Burgaz, **Carreres** et al. 2025. *ZTF SN Ia DR2: Environmental dependencies of stretch and luminosity for a volume-limited sample of 1000 type Ia supernovae*
   Published in Astronomy & Astrophysics. DOI: `10.1051/0004-6361/202450378`

3. Amenouche, Rosnet, Smith, Rigault, Aubert, Barjou-Delayre, Burgaz, **Carreres** et al. 2025. *ZTF SN Ia DR2: Simulations and volume-limited sample*
   Published in Astronomy & Astrophysics. DOI: `10.1051/0004-6361/202452134`

4. Rigault, Smith, Regnault, Kenworthy, Maguire, Goobar, Dimitriadis, Johansson, Amenouche, Aubert, Barjou-Delayre, Bellm, Burgaz, **Carreres** et al. 2025. *ZTF SN Ia DR2: Study of Type Ia supernova light-curve fits*
   Published in Astronomy & Astrophysics. DOI: `10.1051/0004-6361/202450377`

5. Aubert, Rosnet, Popovic, Ruppin, Smith, Rigault, Dimitriadis, Goobar, Johansson, Barjou-Delayre, Burgaz, **Carreres** et al. 2025. *ZTF SN Ia DR2: Exploring SN Ia properties in the vicinity of under-dense environments*
   Published in Astronomy & Astrophysics. DOI: `10.1051/0004-6361/202450951`

6. Rigault, Smith, Goobar, Maguire, Dimitriadis, Johansson, Nordin, Burgaz, Dhawan, Sollerman, Regnault, Kowalski, Nugent, Andreoni, Amenouche, Aubert, Barjou-Delayre, Bautista, Bellm, Betoule, Bloom, **Carreres** et al. 2025. *ZTF SN Ia DR2: Overview*
   Published in Astronomy & Astrophysics. DOI: `10.1051/0004-6361/202450388`

7. Popovic, Rigault, Smith, Ginolin, Goobar, Kenworthy, Ganot, Ruppin, Dimitriadis, Johansson, Amenouche, Aubert, Barjou-Delayre, Burgaz, **Carreres** et al. 2025. *ZTF SN Ia DR2: Evidence of changing dust distribution with redshift using type Ia supernovae*
   Published in Astronomy & Astrophysics. DOI: `10.1051/0004-6361/202450391`

8. Ruppin, Rigault, Ginolin, Dimitriadis, Goobar, Johansson, Maguire, Nordin, Smith, Aubert, Biedermann, Copin, Burgaz, **Carreres** et al. 2025. *ZTF SN Ia DR2: Impact of the galaxy cluster environment on the stretch distribution of Type Ia supernovae*
   Published in Astronomy & Astrophysics. DOI: `10.1051/0004-6361/202450956`

9. Ginolin, Rigault, Copin, Popovic, Dimitriadis, Goobar, Johansson, Maguire, Nordin, Smith, Aubert, Barjou-Delayre, Burgaz, **Carreres** et al. 2025. *ZTF SN Ia DR2: Colour standardisation of type Ia supernovae and its dependence on the environment*
   Published in Astronomy & Astrophysics. DOI: 10.1051/0004-6361/202450943

10. Scolnic, Riess, Murakami, Peterson, Brout, Acevedo, **Carreres** et al. 2025. *The Hubble Tension in Our Own Backyard: DESI and the Nearness of the Coma Cluster*
    Published in The Astrophysical Journal Letters. DOI: 10.3847/2041-8213/ada0bd

Talks

1. Feb. 2025 - **Status of PV cosmology in LSST-DESC** at *DESC workshop on cosmology with peculiar velocities*, Marseille, France

2. Feb. 2025 - **Improving SN Ia Hubble residual scatter with galaxy groups** at *CosmicFlows 2025*, Brisbane, Australia

3. Feb. 2025 - **SNe Ia growth-rate measurements with Rubin-LSST simulations : intrinsic scatter systematics** at *CosmicFlows 2025*, Brisbane, Australia

4. Oct. 2024 - **DESC Project announcement: Measurement of the growth-rate of structures using SN Ia PVs in the BBC framework** at *DESC-TD biweekly meeting*, online

5. Sept. 2023 - **Possible velocity systematic on the Hubble diagram fit** at *ZTF France*, LPC, Clermont-Ferrand, France

6. Aug. 2023 - $f\sigma_8$ **measurement with type Ia supernovae** at *DESC-TD biweekly meeting*, online

7. May 2023 - **Growth-rate measurement with type Ia supernovae** at the *Duke cosmology group' seminar*

8. Nov. 2022 - **Cosmology with the growth rate using type Ia supernovae** at *Action Dark Energy 2022*, Marseille, France

9. May 2022 - **Measuring $f\sigma_8$ with the ZTF SN Ia sample** at *Rubin-LSST France 2022*, LAPP, Annecy, France

10. May 2022 - **Measuring $f\sigma_8$ with the ZTF SN Ia sample** at *ZTF spring meeting*, LPNHE, Paris, France

11. June 2021 - **Peculiar velocities with Type Ia Supernovae** at *Rubin-LSST France 2021*, LPSC, Grenoble, France

Posters

1. 2022 - **Cosmology with the growth rate of structures using type Ia supernovae** at *DESC Summer Meeting 2022*, University of Chicago

2. 2022 - **Cosmology with the growth rate of structures using type Ia supernovae + Proceedings** at *Rencontres de Moriond*