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**Fakultät für Mathematik**  
Oskar-Morgenstern-Platz 1  
A-1090 Vienna  
Austria

<https://owos.univie.ac.at>

## ONE WORLD OPTIMIZATION SEMINAR

February 7<sup>th</sup> 2022 @ 15:30 CET (Central European Time)

**PATRICK JOHNSTONE**

(Brookhaven National Laboratory)

## Stochastic and Variance-Reduced Monotone Operator Splitting

**Abstract.** Monotone inclusions are a powerful and flexible paradigm for studying various problems arising in machine learning (ML), signal processing, and beyond. In this work, we are concerned with the *projective splitting* algorithm for monotone inclusions. This family of methods achieves *full-splitting* on monotone inclusions: set-valued operators are handled via resolvents, and single-valued and linear operators via evaluations and adjoints. However, these methods are unable to handle *stochastic* estimators of single-valued operators, making them impractical for most ML problems. In this work, we address this, providing the first stochastic projective splitting method. Almost-sure iterate convergence is proved under bounded noise variance with decaying stepsizes, and a convergence rate is derived. Most recently, we have extended the method to allow for a broad family of *variance-reduced* estimators. With these estimators, the method may use fixed, rather than decaying, stepsizes and obtains a significantly better iteration complexity than deterministic projective splitting.

*The link of the zoom-room of the meeting and the corresponding password will be announced the day before the talk on the mailing list of the seminar, to which one can subscribe on <https://owos.univie.ac.at>.*