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### ACCEPTED MANUSCRIPT

# Scheduling and Performance Analysis under a Stochastic Model

# for Electric Vehicle Charging Stations

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#### Abstract

Wide-spread infrastructures for electric vehicle battery charging stations are essential in order to significantly increase the implementation of electric vehicles (EVs) in the foreseeable future. Therefore, we propose a stochastic model and charge scheduling methods for an EV battery charging system. We utilize a flexible Poisson process with a hidden Markov chain for modeling the complexity of the time-varying behavior of the EV stream into the system. Relevant random factors and constraints, which include parking times, requested amounts of electricity, the number of parking lots (charging facilities), and maximal demand level, are considered within the proposed stochastic model. Performance measures for the proposed charge scheduling are analytically derived by obtaining stationary distributions

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