Introduction

Project: Machine learning approach to Kalman filtering in track reconstruction

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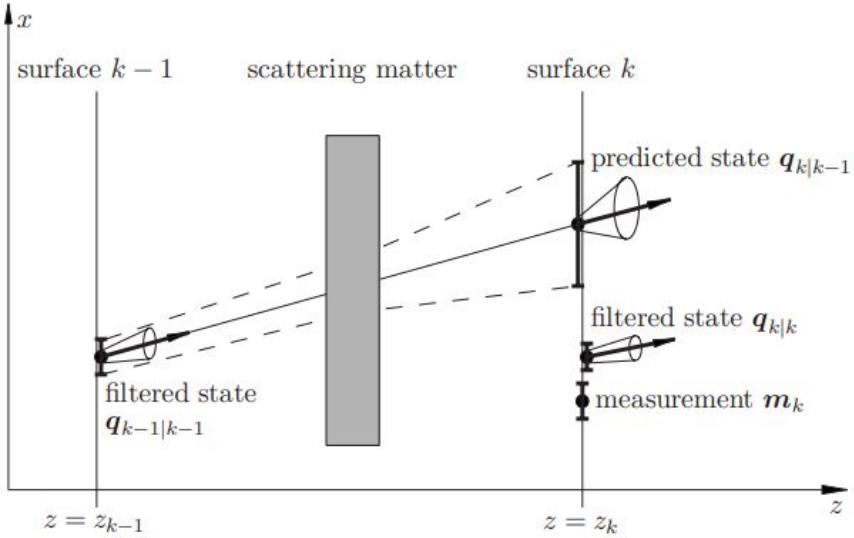
Background

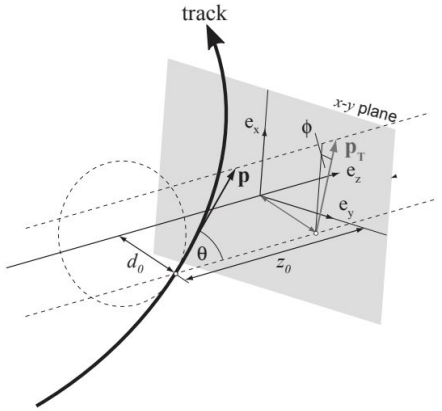
- The Kalman filter is a deterministic algorithm that combines **predicted and observed states**.
- Kalman filtering propagates track states between detector layers to **generate track candidates** as well as smooth candidates to yield track parameters.
- Kalman filters are provably optimal for linear systems.



(Strandlie and Frühwirth, 2010)

Goals

- Propagation requires solving for equations of motion in inhomogeneous magnetic fields.
- Develop a **machine learning algorithm** that embeds the properties of the Kalman filter.
- Explore different **neural network architectures** that can be applied to the problem.



Global track parameters e.g. wrt. perigee

$$\left(d_0, z_0, \phi, \theta, \frac{q}{p}\right)$$

(ATLAS Software Documentation)