Department of Physics and Astronomy
University of Heidelberg

Bachelor Thesis in Physics
submitted by

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handed in on

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Characterization of a multispecies imaging system

This Bachelor Thesis has been carried out by Robin Eberhard at the
Institute for Theoretical Physics in **Heidelberg**
under the supervision of
Prof. Dr. Matthias Weidemüller

Characterization of a multispecies imaging system

Robin Eberhard

Abstract Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

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1.1. Stuff

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1.2. More stuff

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1.3. Interesting stuff

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2. Setup for high resolution imaging

2.1. Experimental requirements

2.2. Camera for double species imaging

2.2.1. Comparison with the present setup

2.2.2. Dark current

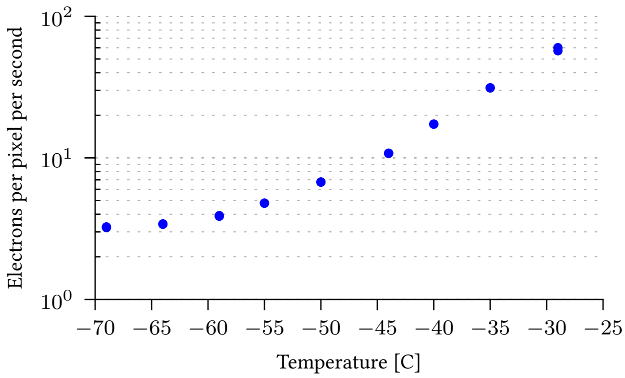

Figure 2.1.: **Dark noise** The dark noise follows a power- law dependency in the high temperature regime. Since these measurements were taken without water cooling installed, deviations are visible in the low temperature parts of the plot.

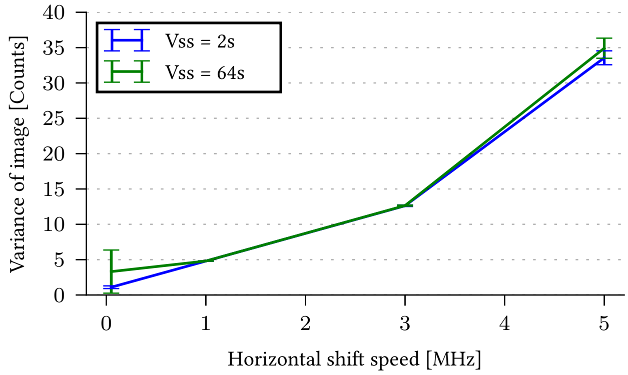

Figure 2.2.:

2.2.3. Readout noise

2.2.4. Quantum efficiency

2.2.5. Pixel correlations

2.3. Mechanical shutter

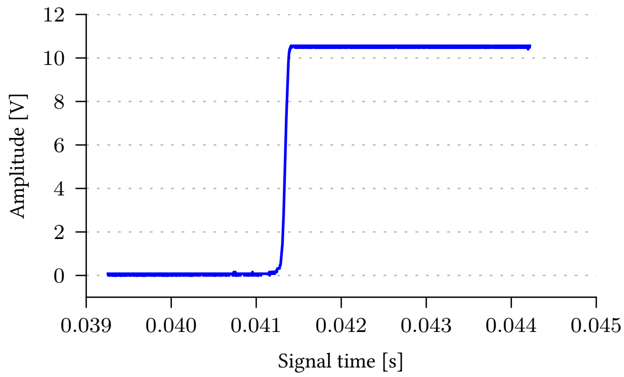

Figure 2.3.: **Shutter characterization** The dynamics of the shutter were measured using a laser with a variable x offset, and a photodiode measuring the laser intensity. Fitting the signal using an error function yields the time until the shutter opened to this offset.

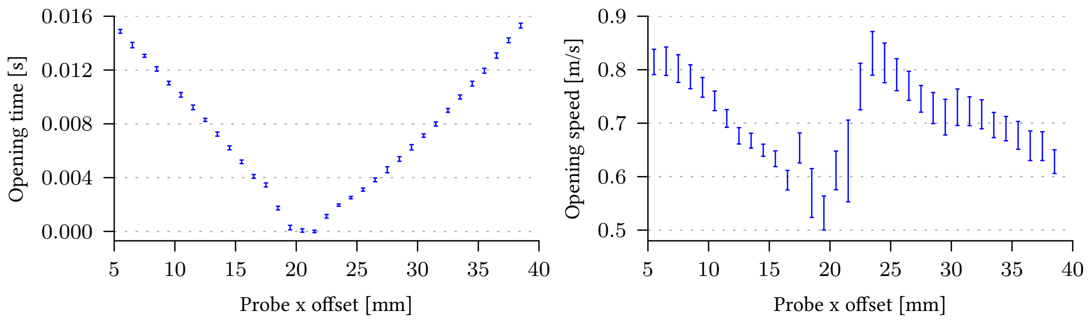

Figure 2.4.: **Shutter characterization**

2.3.1. Electronic setup

2.3.2. Dynamical properties

2.4. Mask for the CCD sensor

2.4.1. Fast kinetics mode

2.4.2. Frequency response of an imaging system

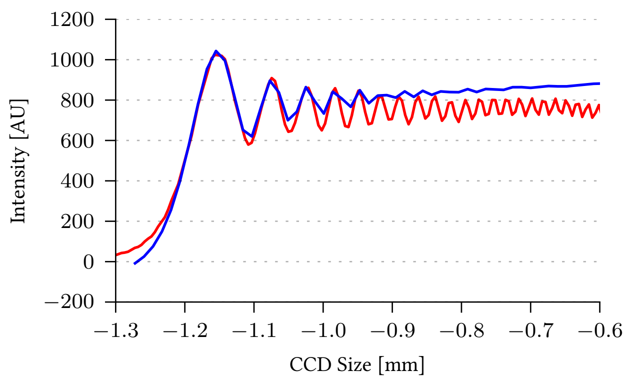

Figure 2.5.: **Diffraction measurement** The characterized the diffraction effect on the camera using a custom-built slit, placing it as close as possible to the chip. The parameters were measured as $d = 10.9\,\text{mm}$, $a = 2.5\,\text{mm}$ and $\lambda = 852\,\text{nm}$

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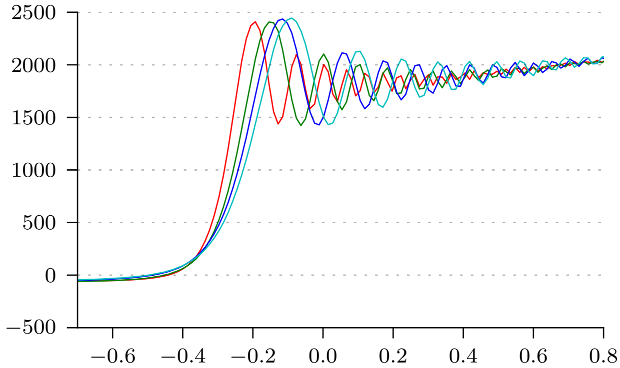

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