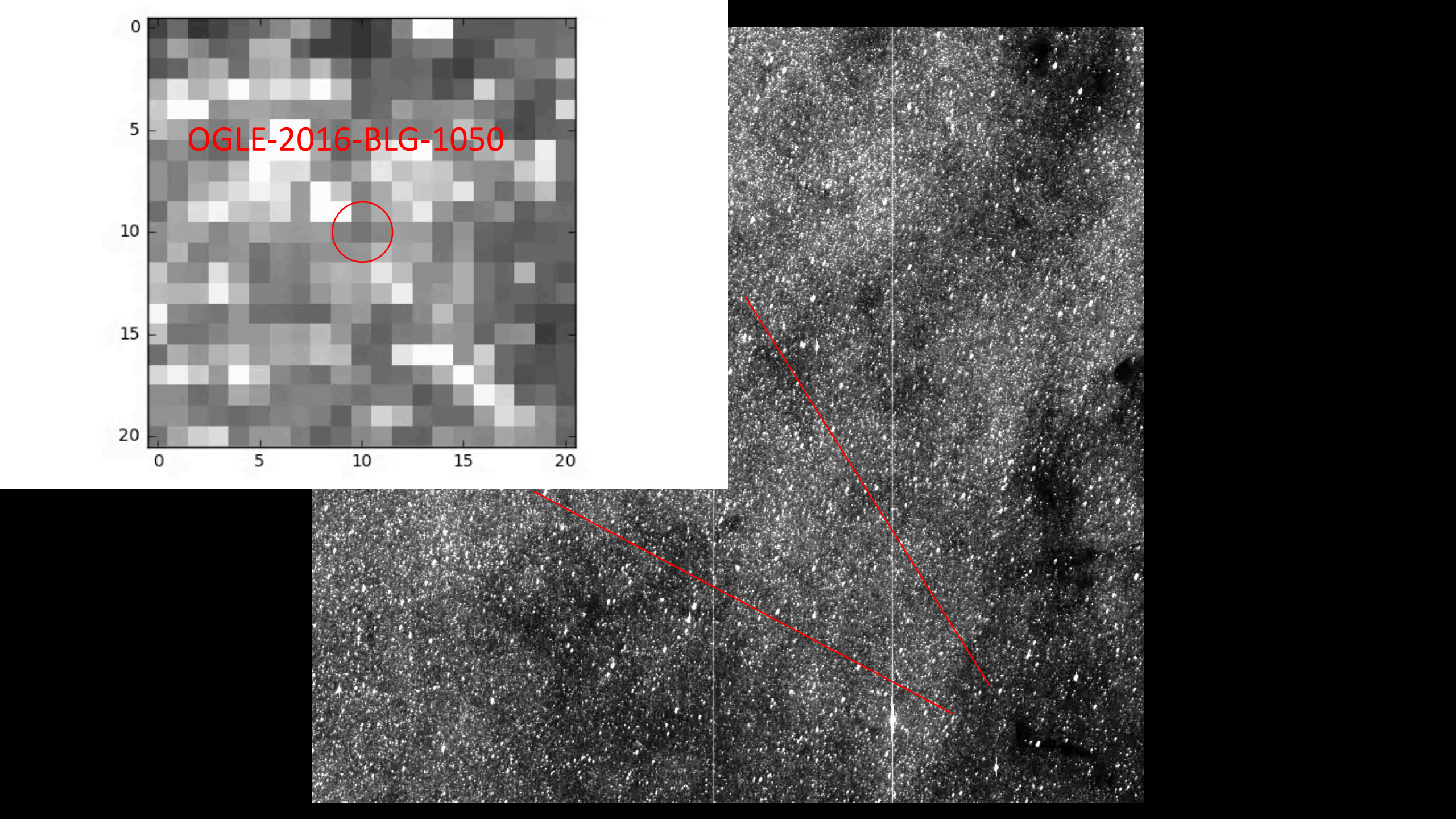
# K2 photometry: Causal Pixel Model

Dun Wang

New York University


OGLE-2016-BLG-1050
0
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10
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20
0
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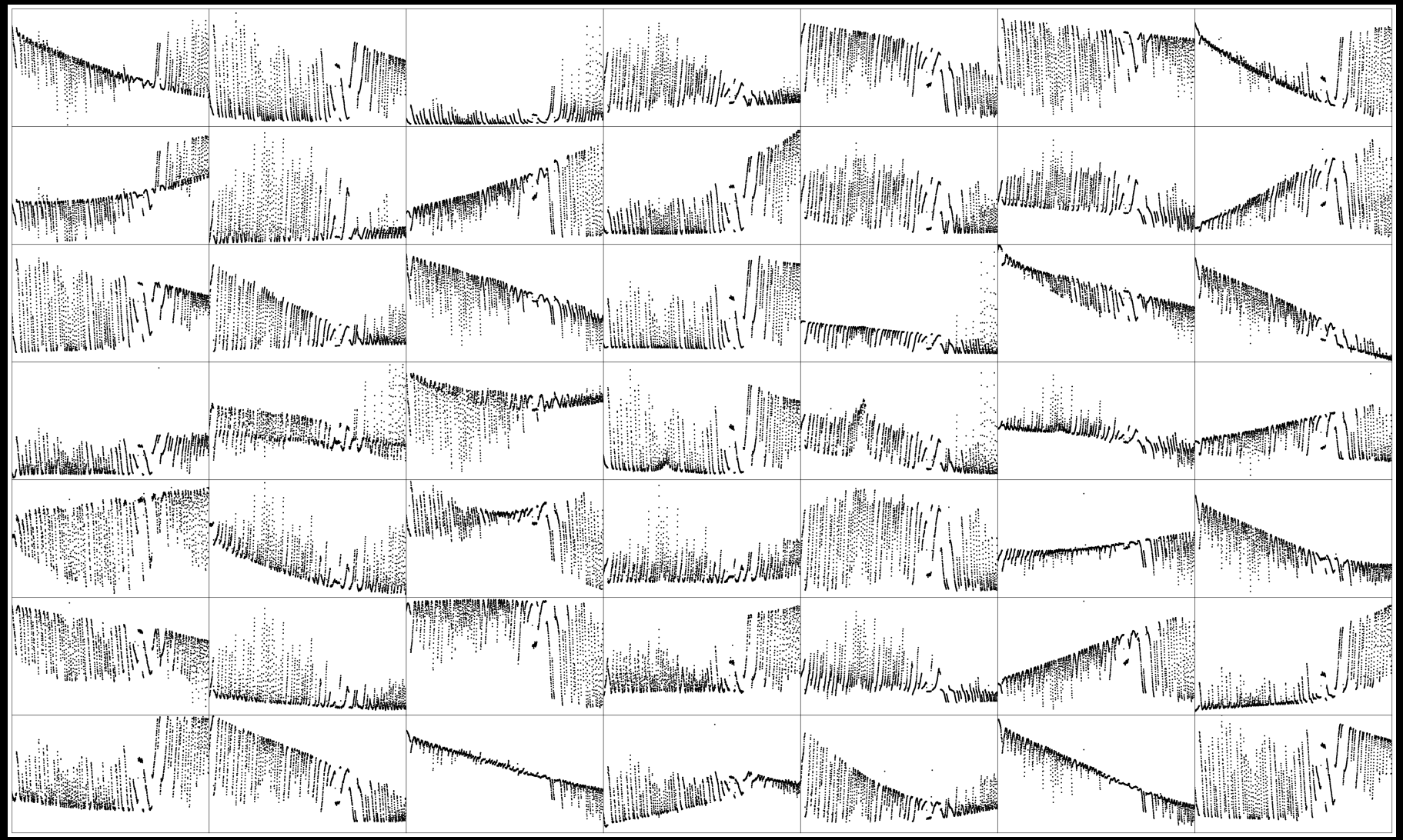
20

# OGLE-2016-BLG-1050



- Crowded field Differencing
- Systematics (pointing, inter- and intra-pixel variation) CPM

# Causal Pixel Model

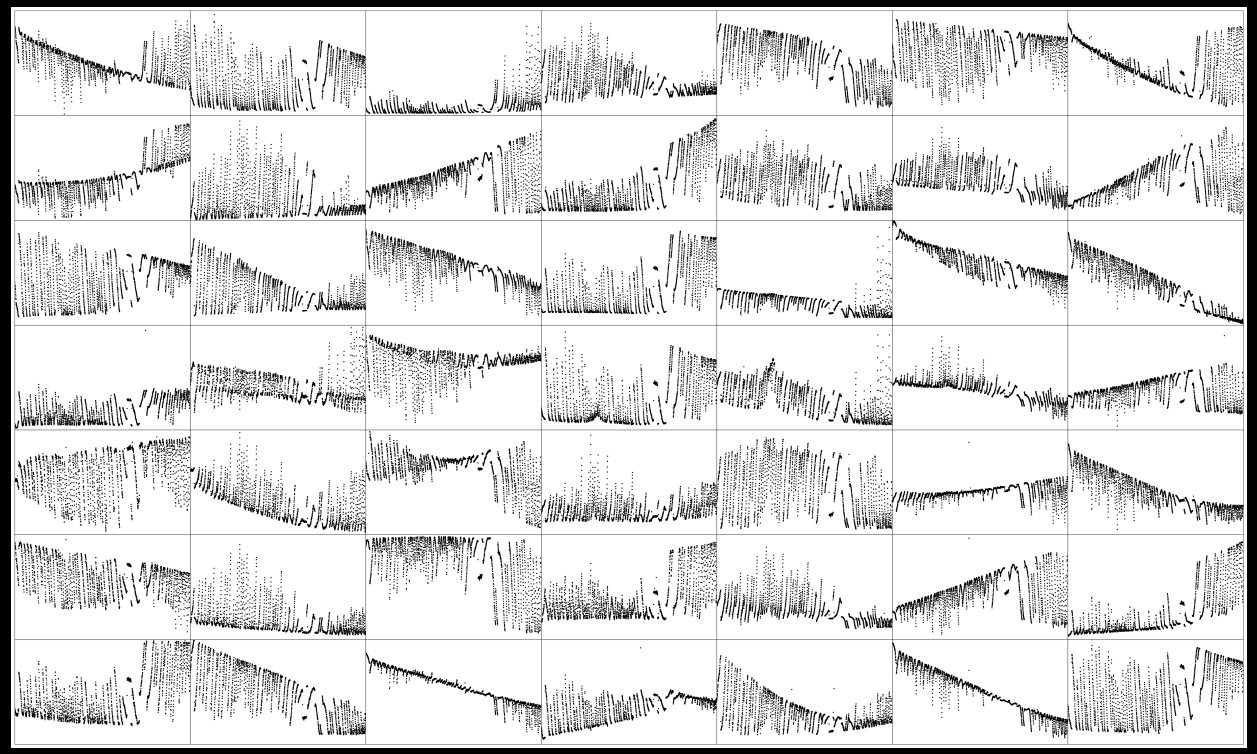
David Hogg
NYU

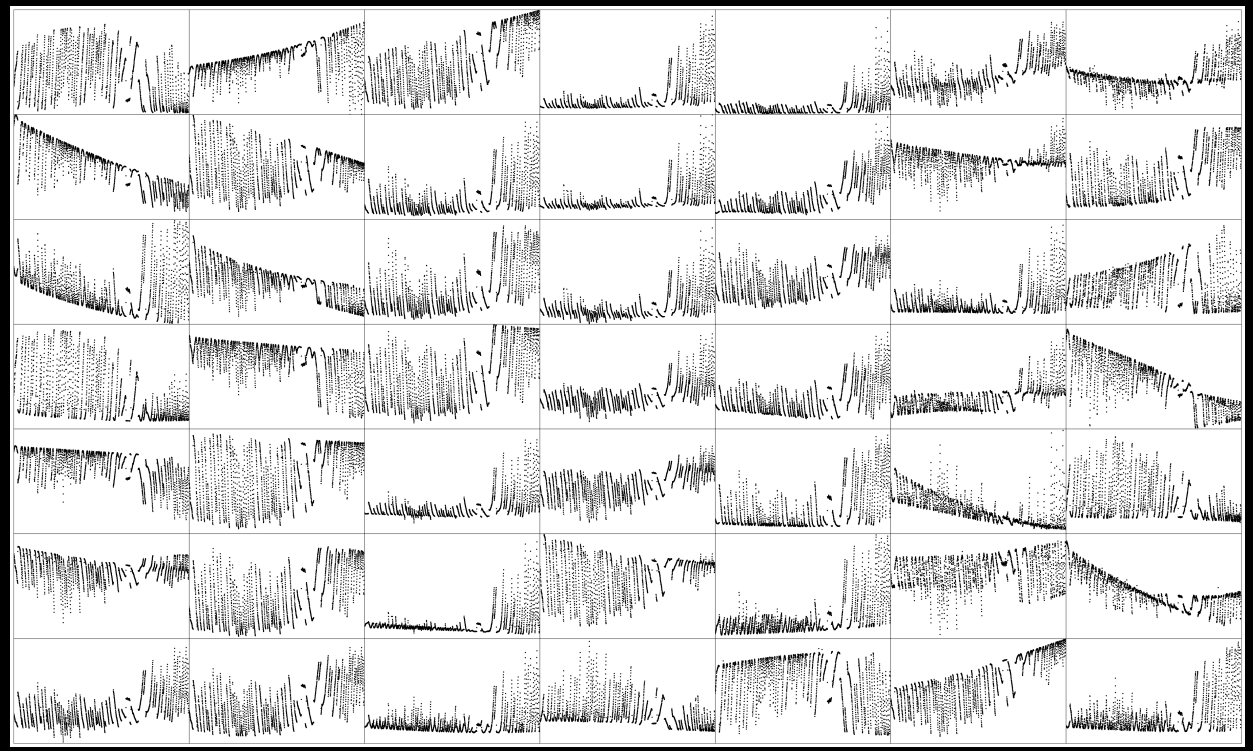
Daniel Foreman-Mackey
UW

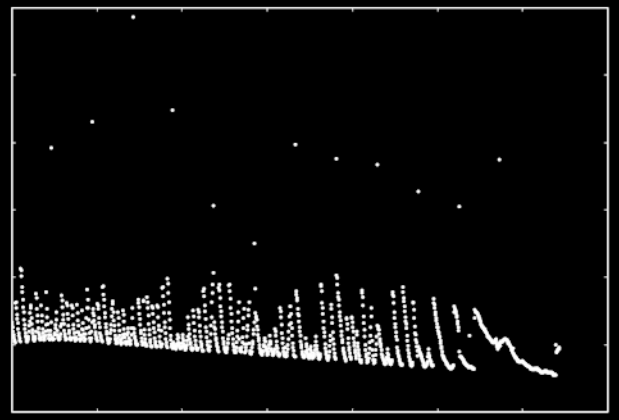
Bernhard Schölkopf
MPI-IS

# Causal Pixel Model

OGLE-2016-BLG-1050







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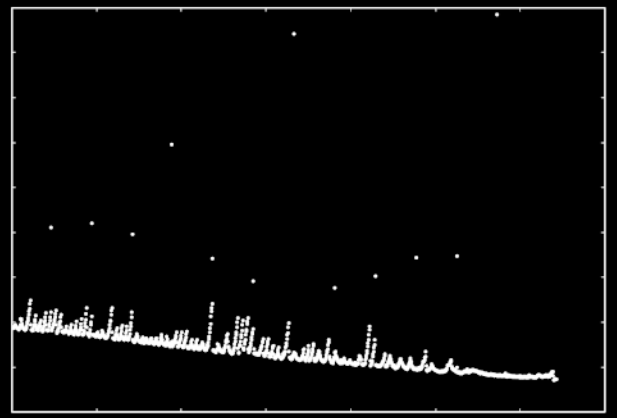

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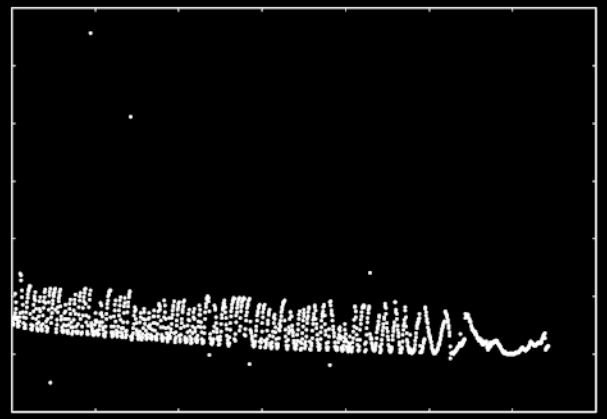

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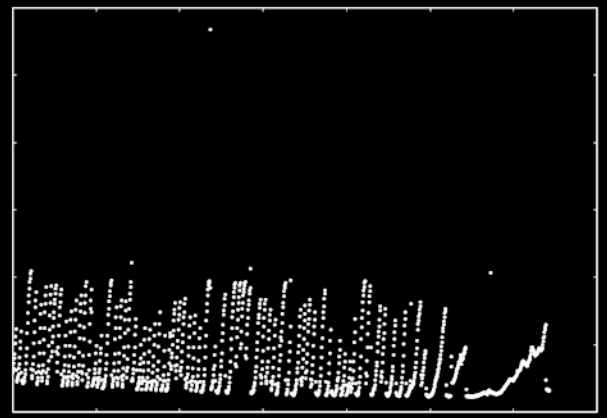

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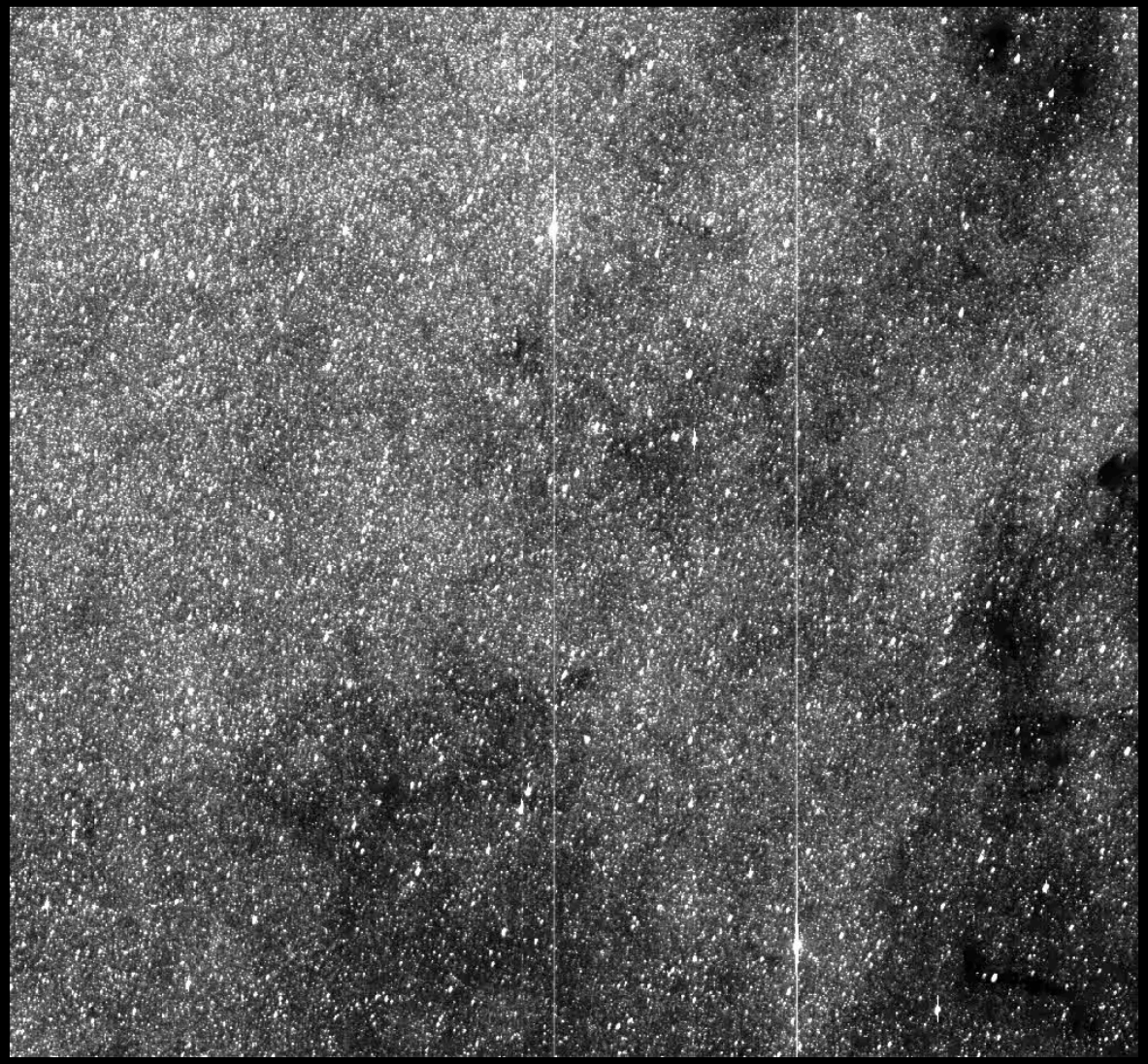
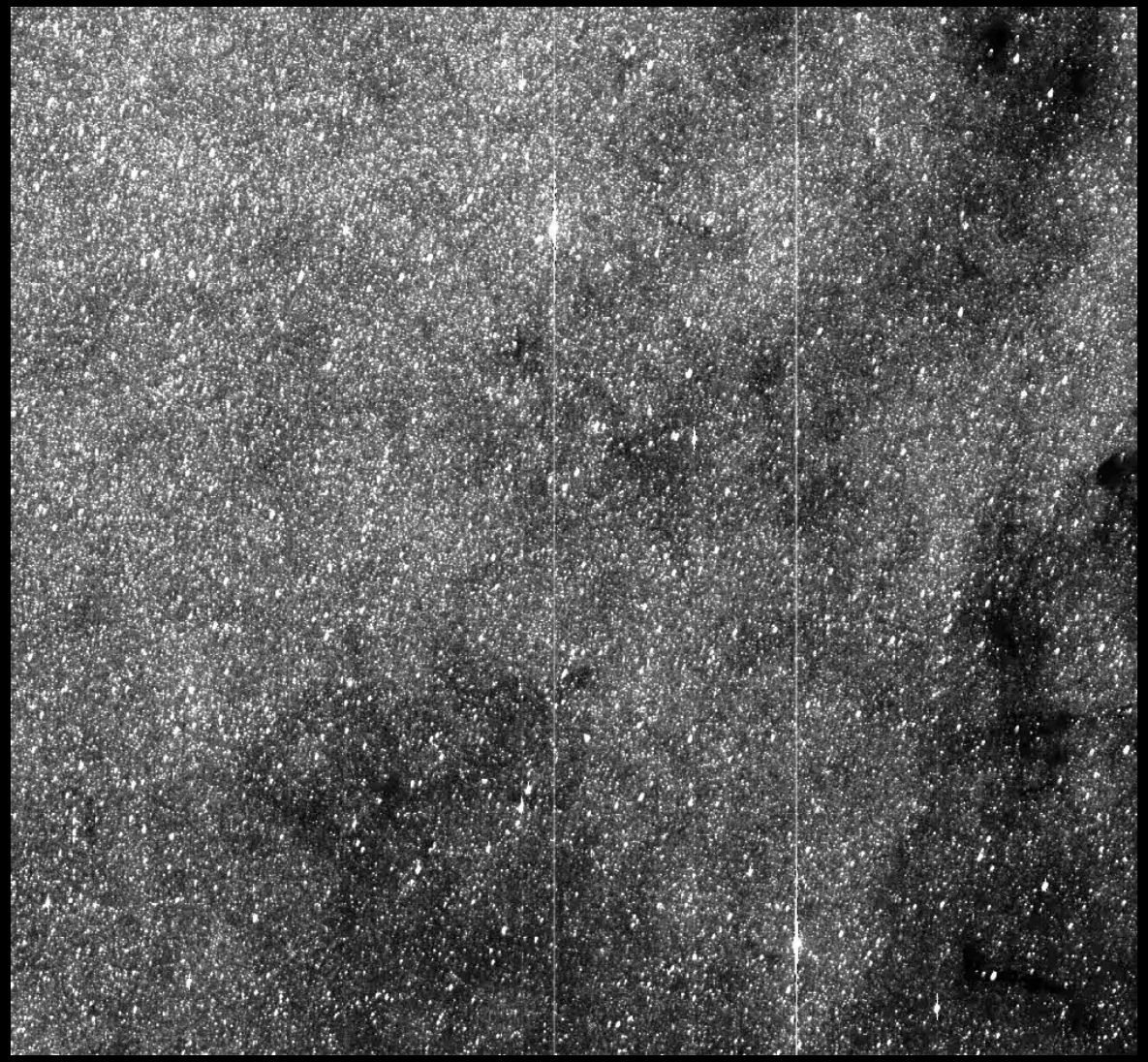
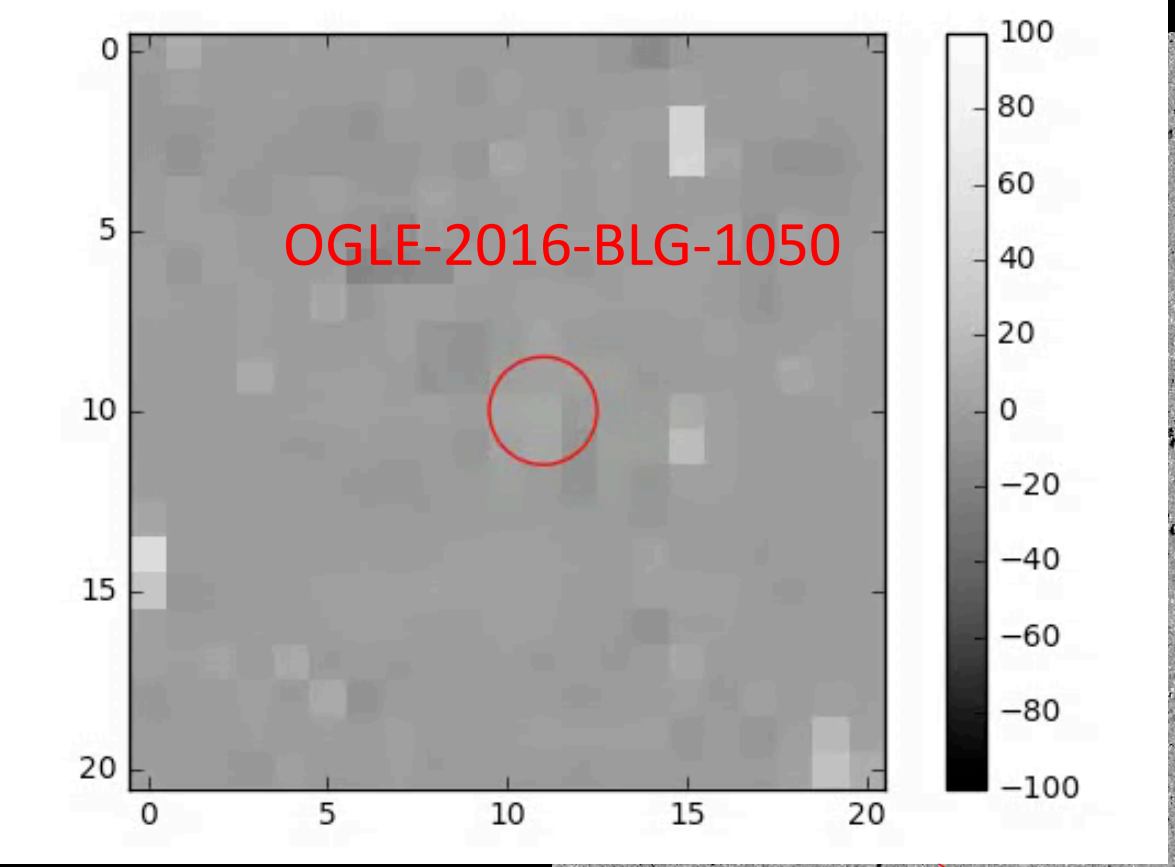
$$I_{m,n} = I^*_{m,n} + e_{m,n}$$

$$I^*_{m,n} = \sum_{m' \in \mathcal{M}_m} a_{m,n,m'} \, I_{m',n}$$






OGLE-2016-BLG-1050
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10
15
20
100
80
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−20
−40
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−80
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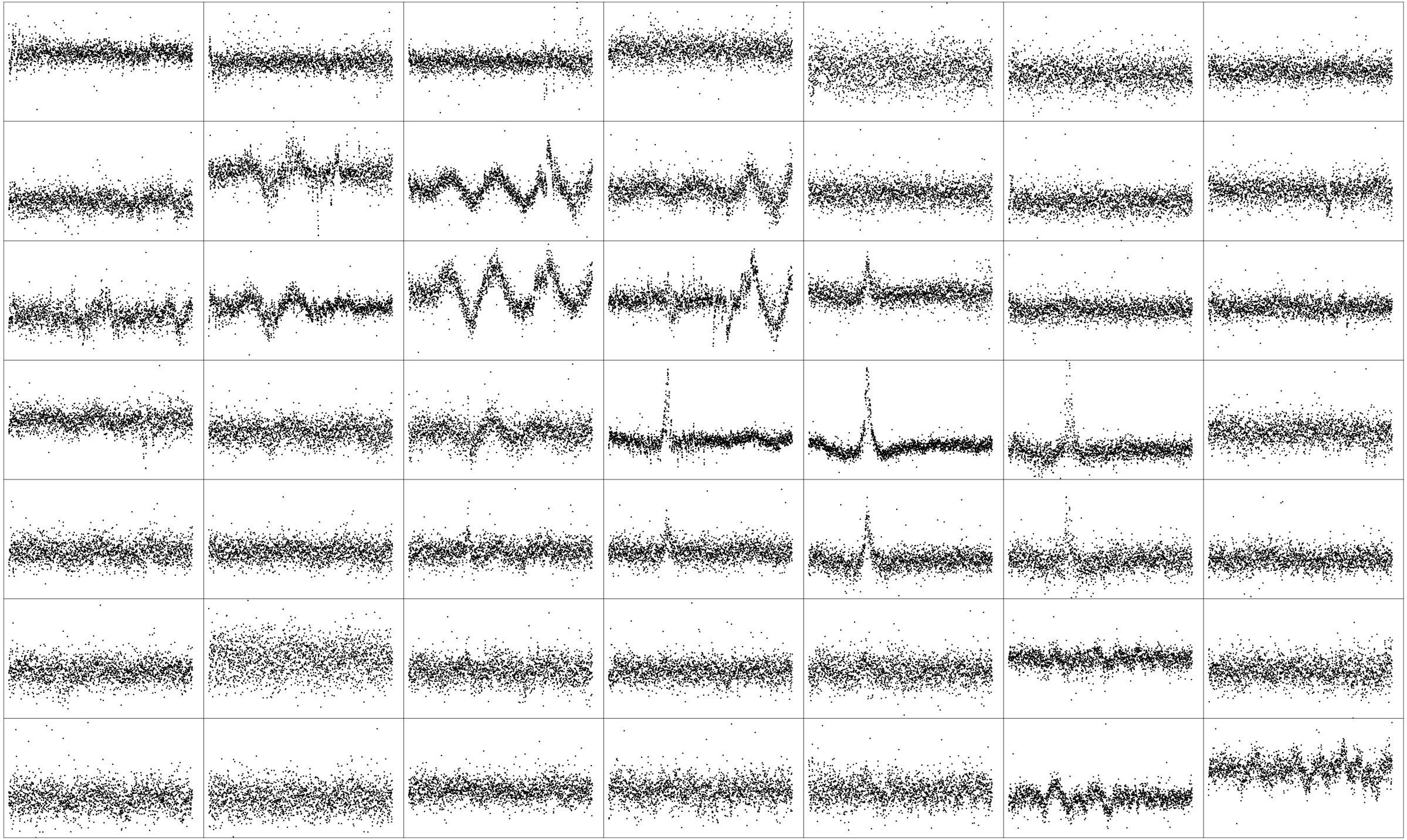
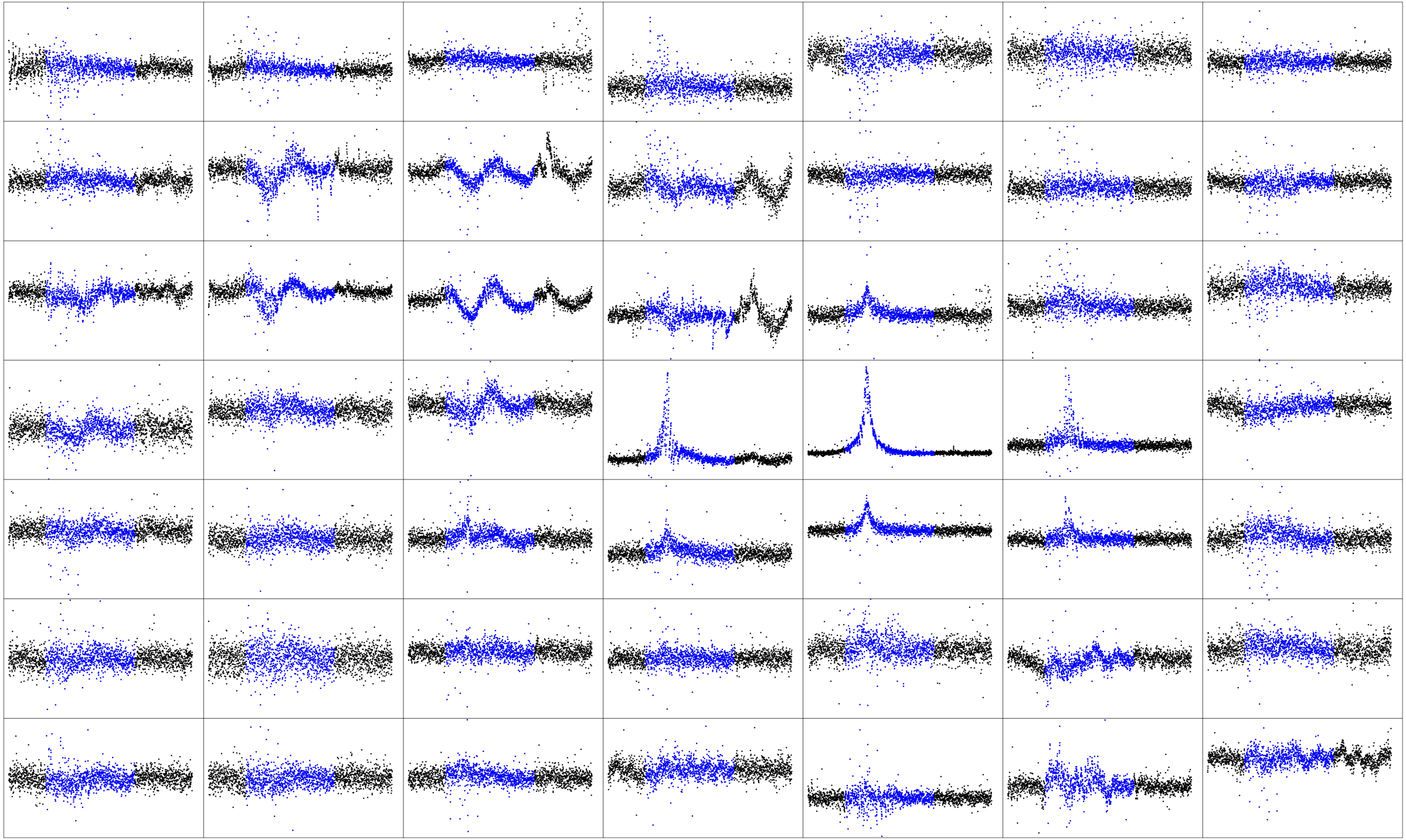
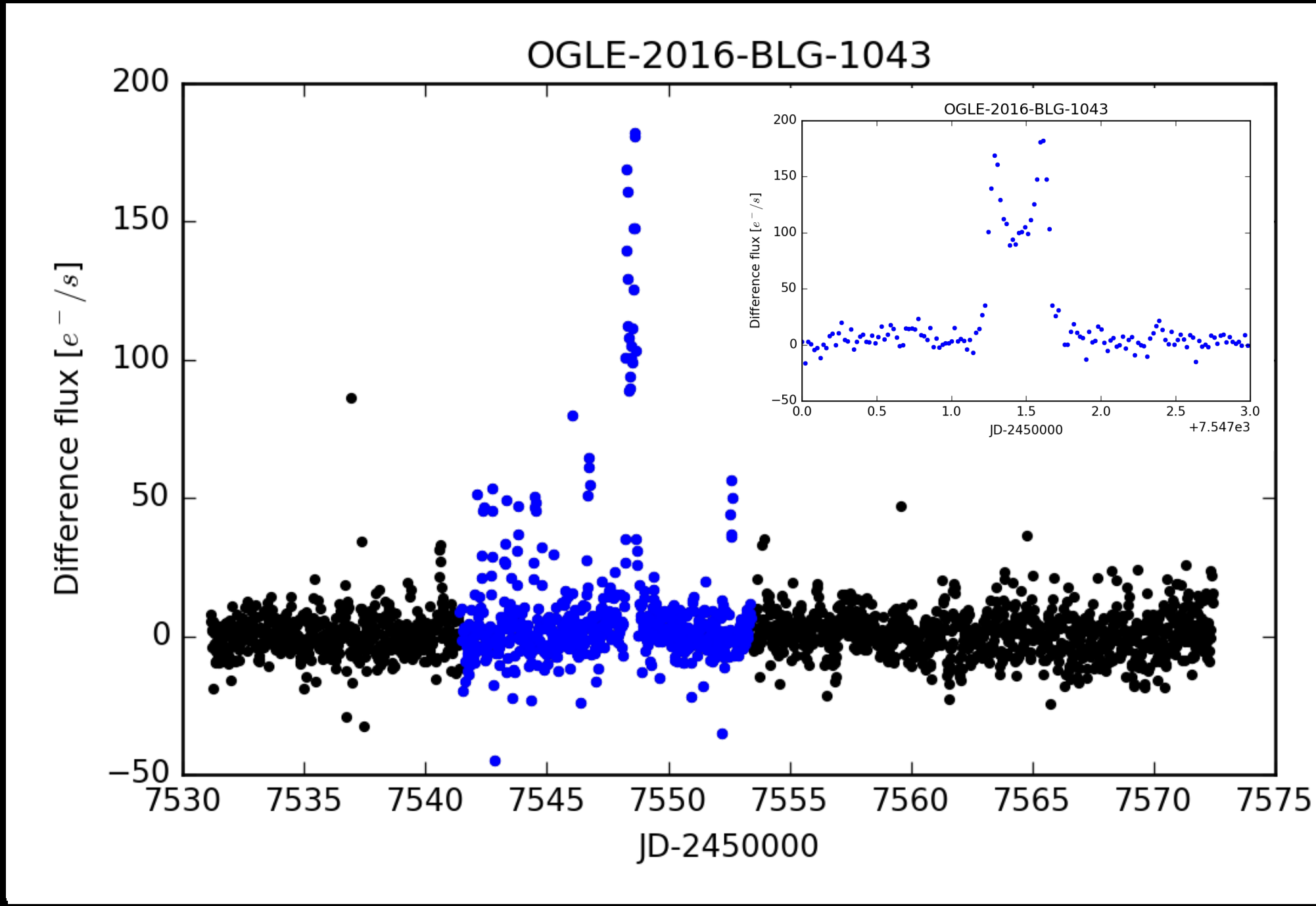
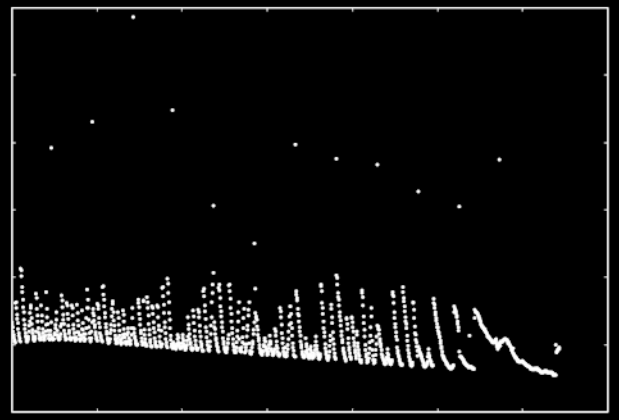





OGLE-2016-BLG-1043
Difference flux [$e^-/s$]
JD-2450000
200
150
100
50
0
−50
7530
7535
7540
7545
7550
7555
7560
7565
7570
7575
OGLE-2016-BLG-1043
Difference flux [$e^-/s$]
JD-2450000
+7.547e3
0.0
0.5
1.0
1.5
2.0
2.5
3.0



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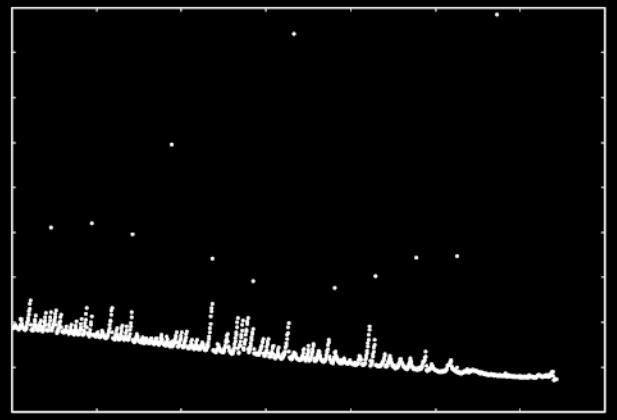
Systematics Model
(CPM)



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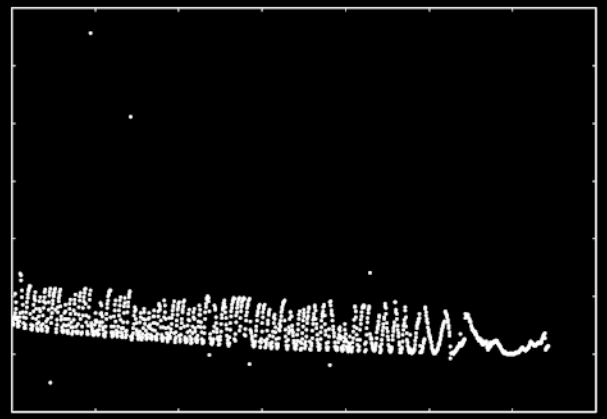

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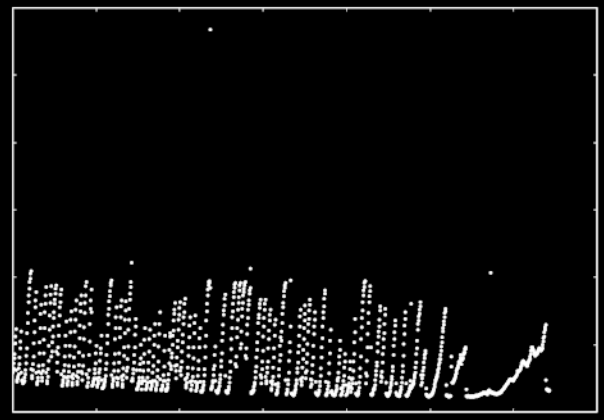

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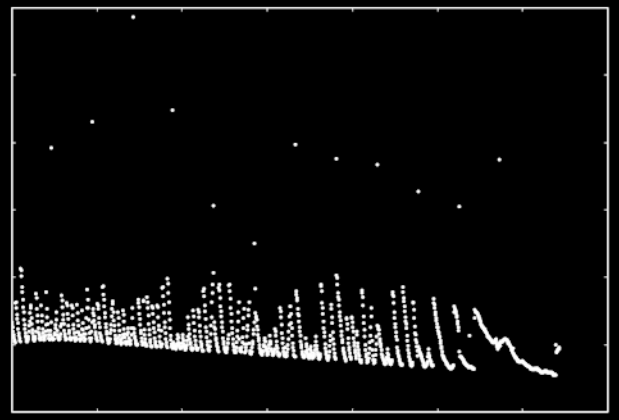
Uncompleted Model!



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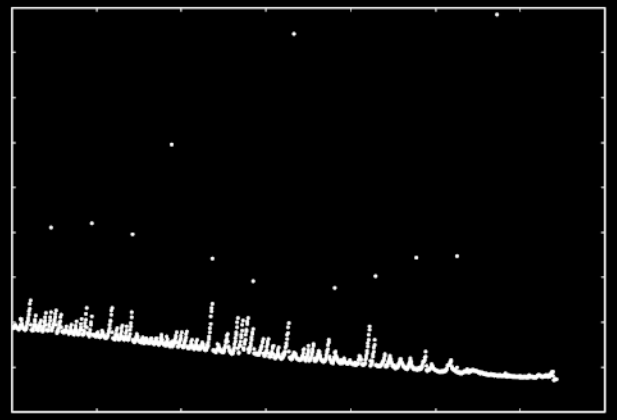
Systematics Model
(CPM)



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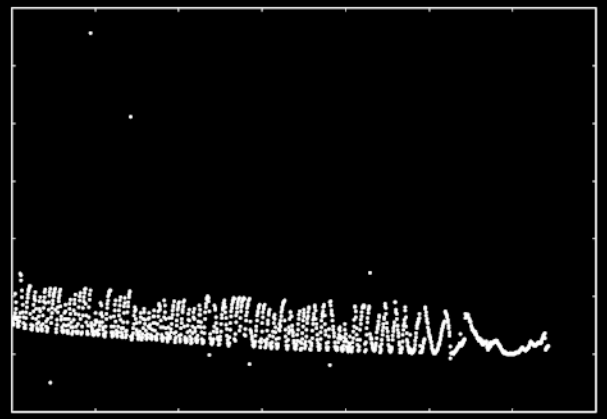

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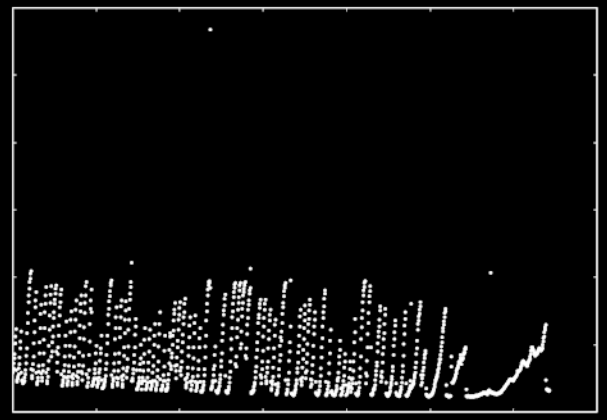

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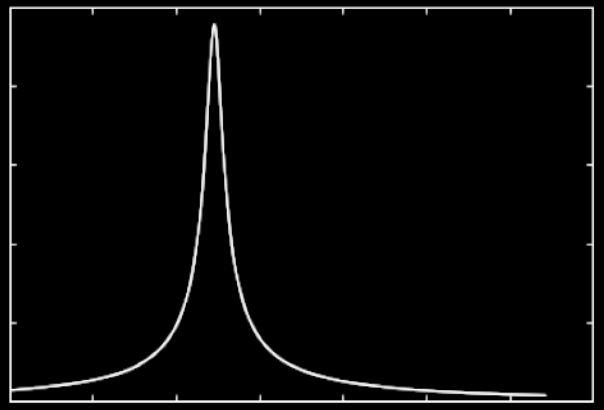

Astronomical Model,
eg Microlensing

# Time table

# version usable for most people

- - better control of parameters
- - conventions better documented
- Timescale: 2 weeks from now

# good understanding of CPM parameters

- - tests on selected short events including ground-based data and satellite parallax
- - tests on detached eclipsing binaries
- Timescale: 6 weeks from now

# profile photometry

- - allow tabulated or analytical PRF
- - incorporate Kepler PRF
- Timescale: 10 weeks from now

# photometry of the long events

- - tests on well-characterize events but with part of the data removed
- - tests on selected in- and out-of-superstamp events, also C11 events
- - tests on Mira variables (or other variable stars with light curves similar to microlensing events)
- Timescale: 15 weeks from now

# fine-tuning details:

- - can we present binary events photometry without model assumed?
- - events with nearby variable stars
- Timescale: a few months from now