

PROCEDURAL TEXTURE SYNTHESIS BY LOCALLY CONTROLLED SPOT NOISE



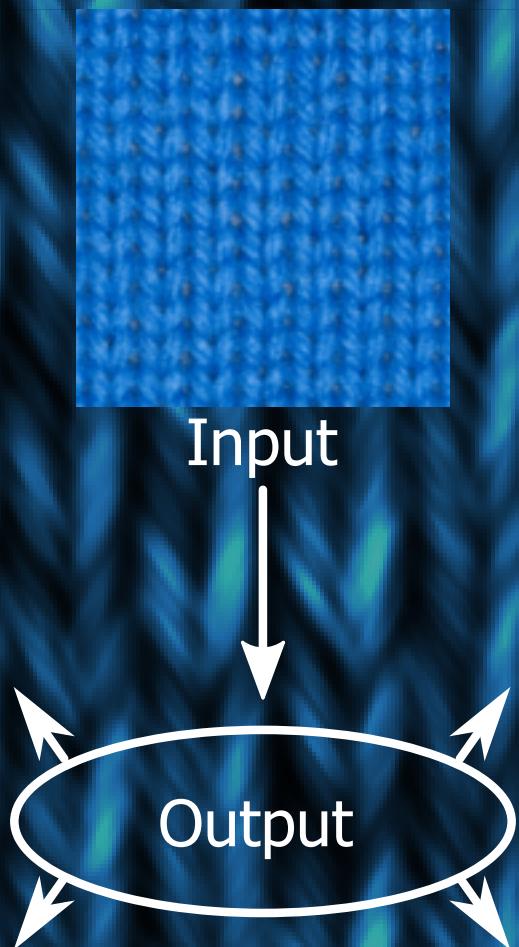
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<http://unilim.fr/LCSNoise>

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Speaker notes available on the online presentation

CONTEXT



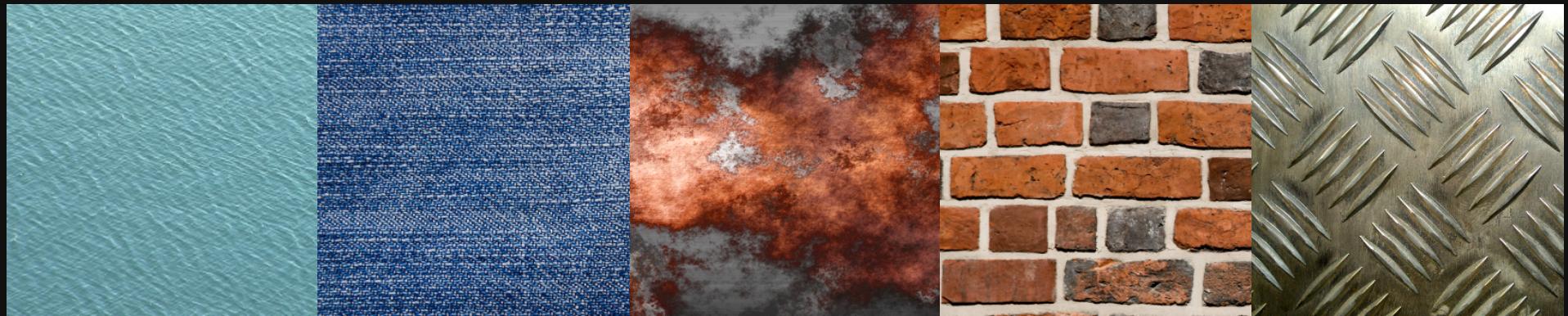
Larger, more detailed scenes

- Long authoring time

Procedural content creation

- Procedural texture synthesis
 - By example
 - Controlled edition

TEXTURE SYNTHESIS

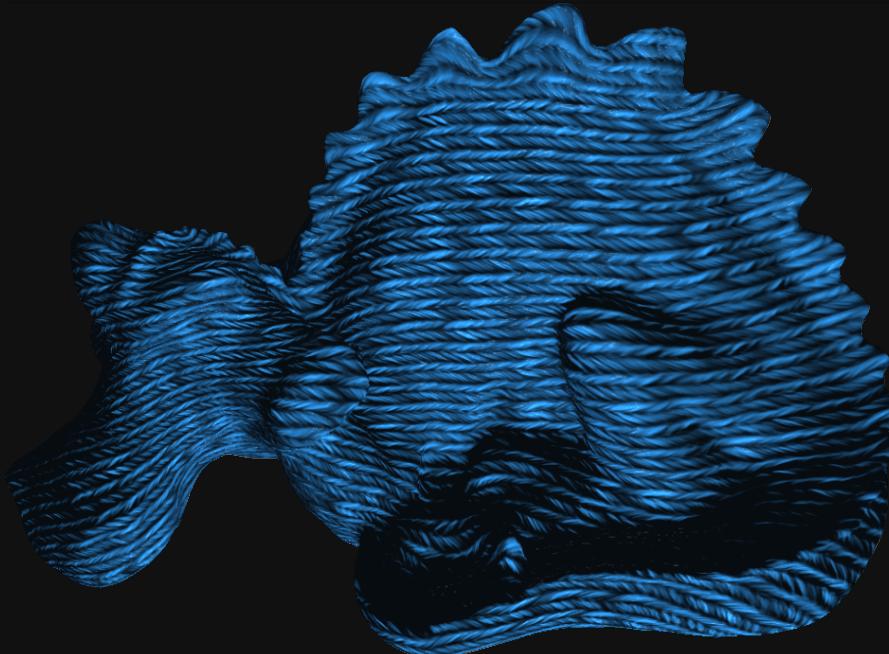


← Irregular \ Stochastic → Near-regular \ Structured

PROCEDURAL TEXTURING BY NOISES

PROS

- No Repetition
- Compactness
- Continuity
- Generic
- Fast evaluation



Can reproduce random and structured textures !

- Local Random Phase Noise (LRPN) [*Gilet et al. 2014*]

PROCEDURAL TEXTURING BY NOISES CONS

Spectral definition **hard to control**

- Not very artist friendly
 - By example approach

By example noises visual edition ?

- **Visual modification = New example**

OUR CONTRIBUTIONS

Keeping LRPN benefits

- Fast evaluation
- Structures reproduction
- By example approach

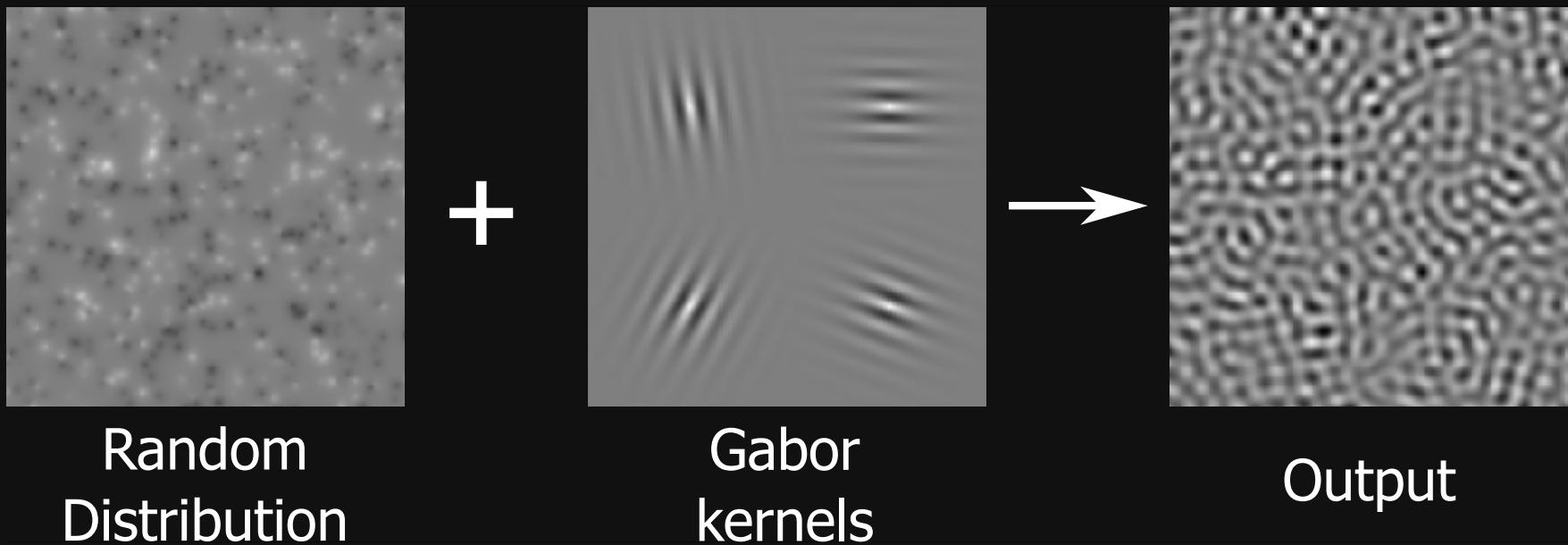
Improving **spatial control**

- Over **structural features**
- Over the **pattern structure** itself

SPARSE CONVOLUTION NOISES

Random distribution of impulses + kernel

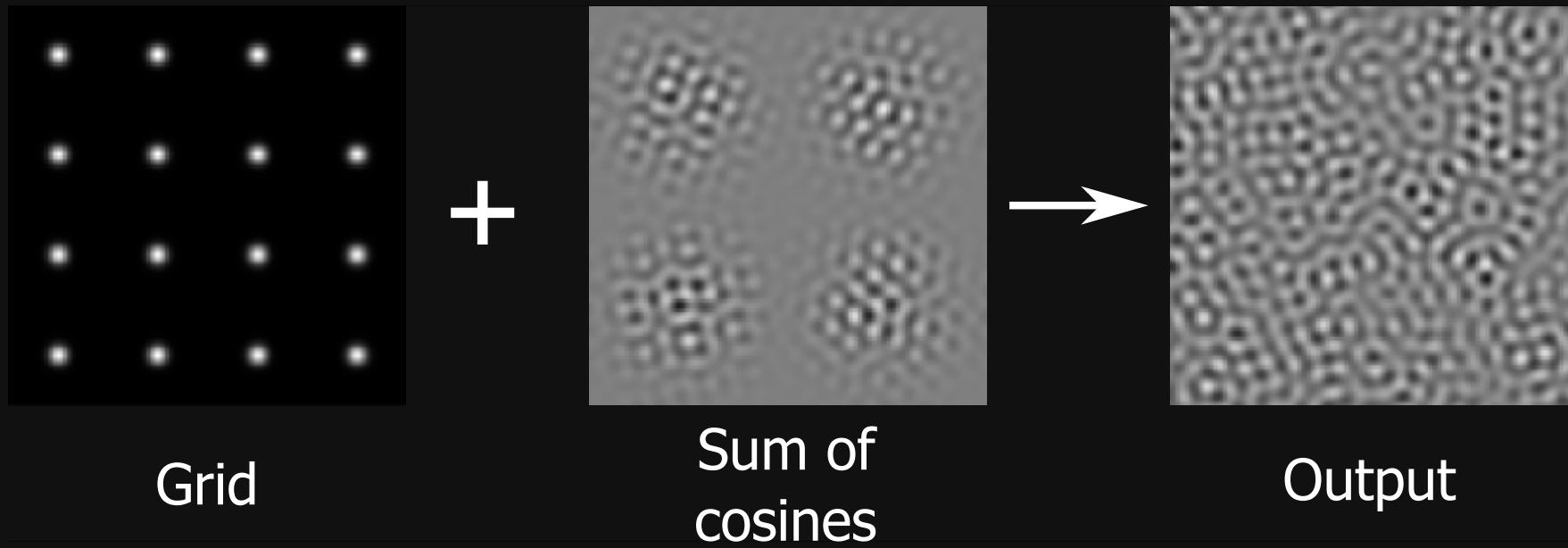
- Gabor kernel [*Galerne et al. 2012*] for example :



SPARSE CONVOLUTION NOISES

LRP noise : regular distribution + sum of cosines

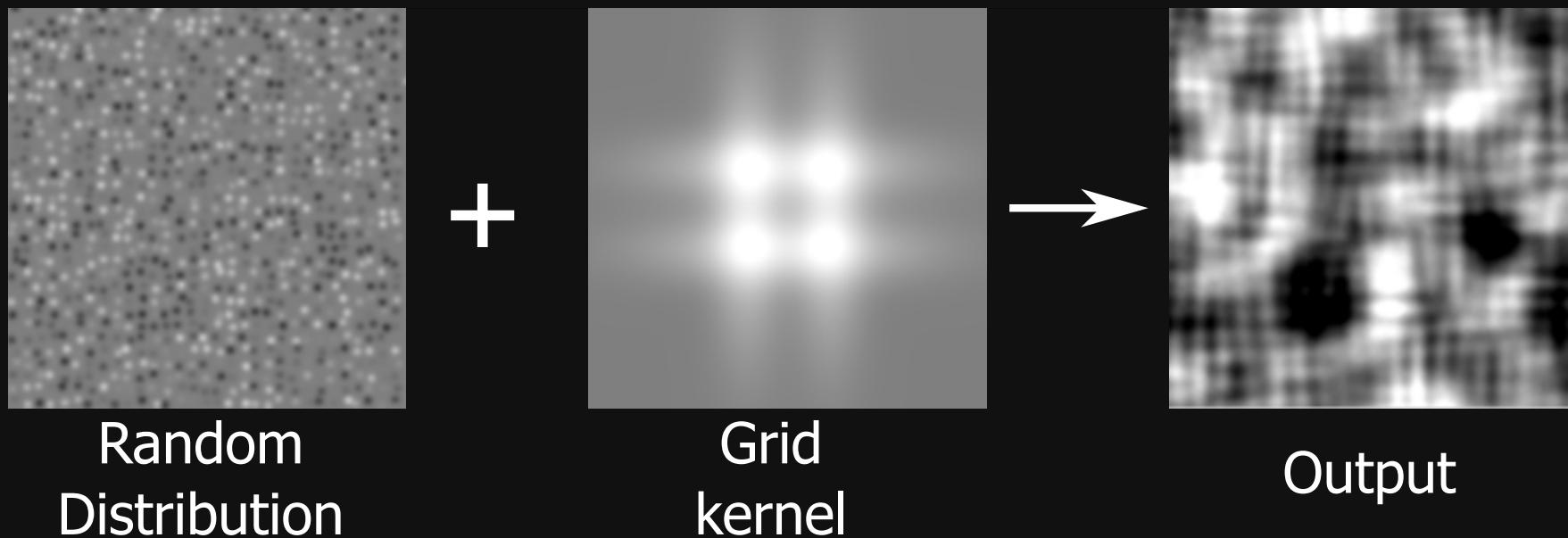
- Produces structures using fixed phases



SPARSE CONVOLUTION NOISES

Spot Noise : random distribution + structured kernels [Van Wijk 1991]

- **Kernel spatial structure** transferred in the result

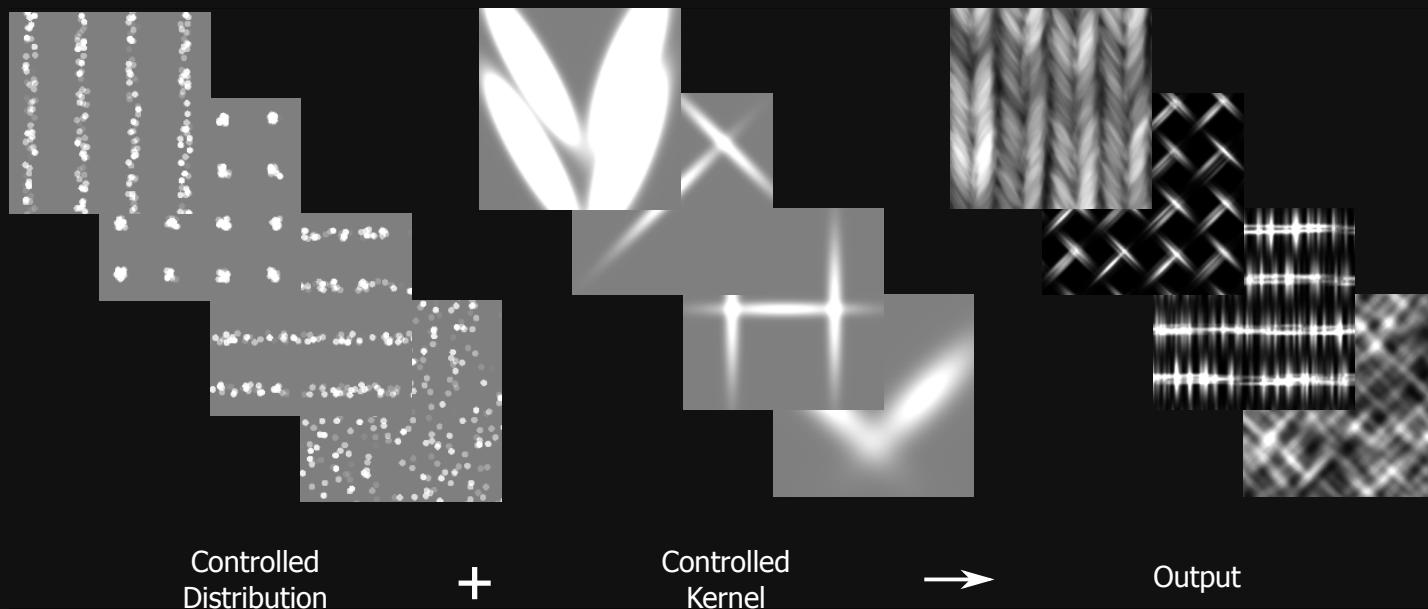


LOCALLY CONTROLLED SPOT NOISE

THE NOISE MODEL

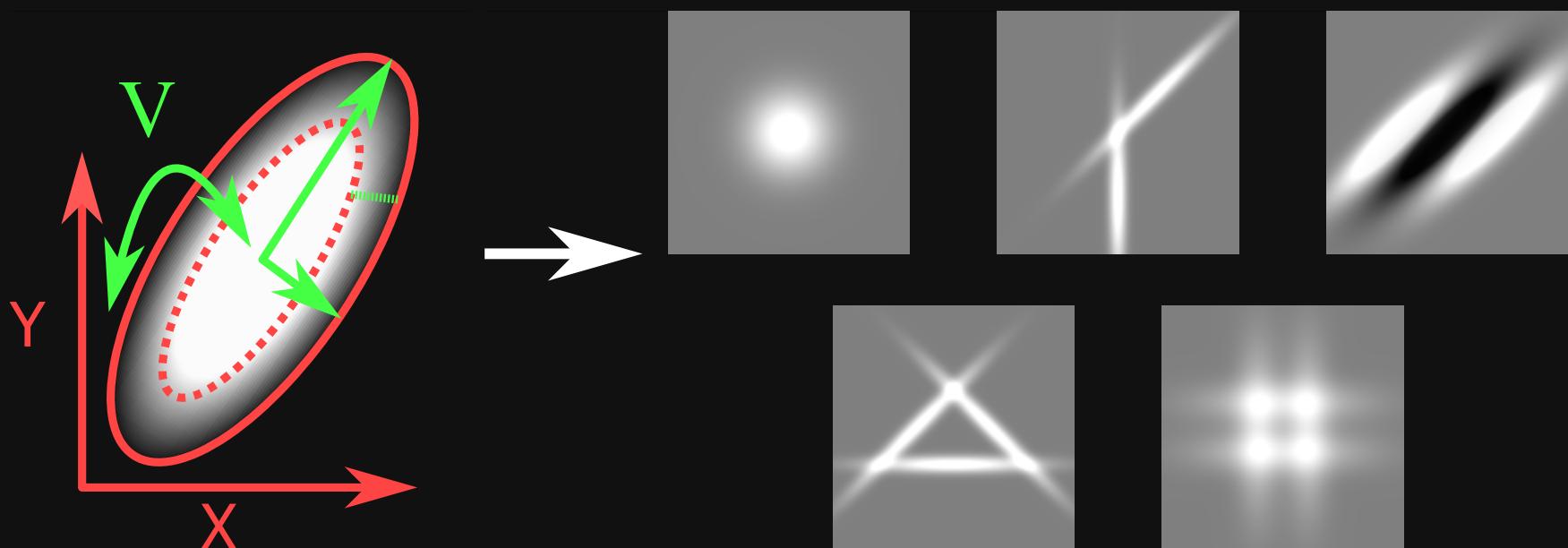
Fully procedural spot noise

- Procedural Multi-Gaussian spot
- Controlled non-uniform distribution of impulses



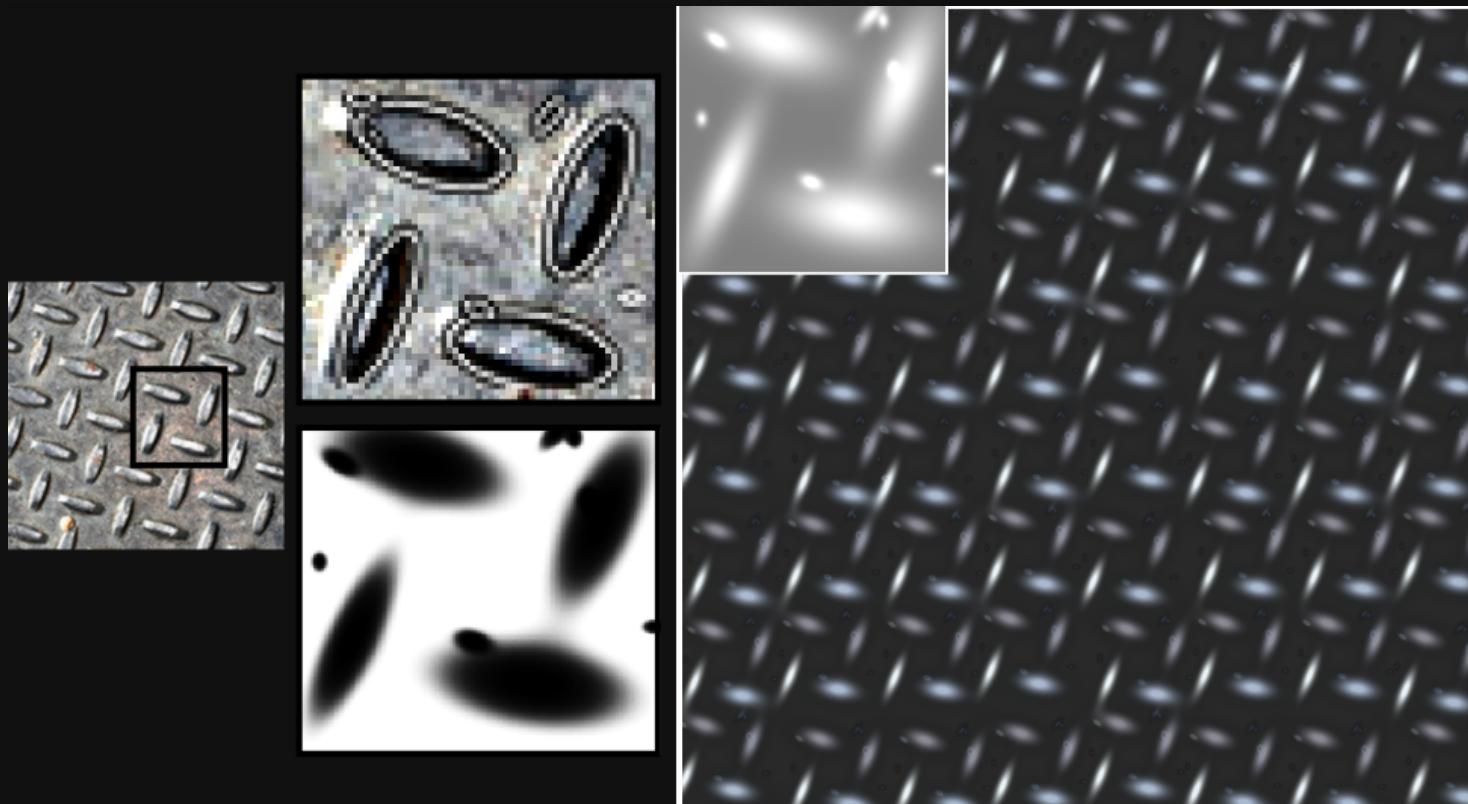
LOCALLY CONTROLLED SPOT NOISE DETAILS

- Ellipsoidal Gaussian function as primitive



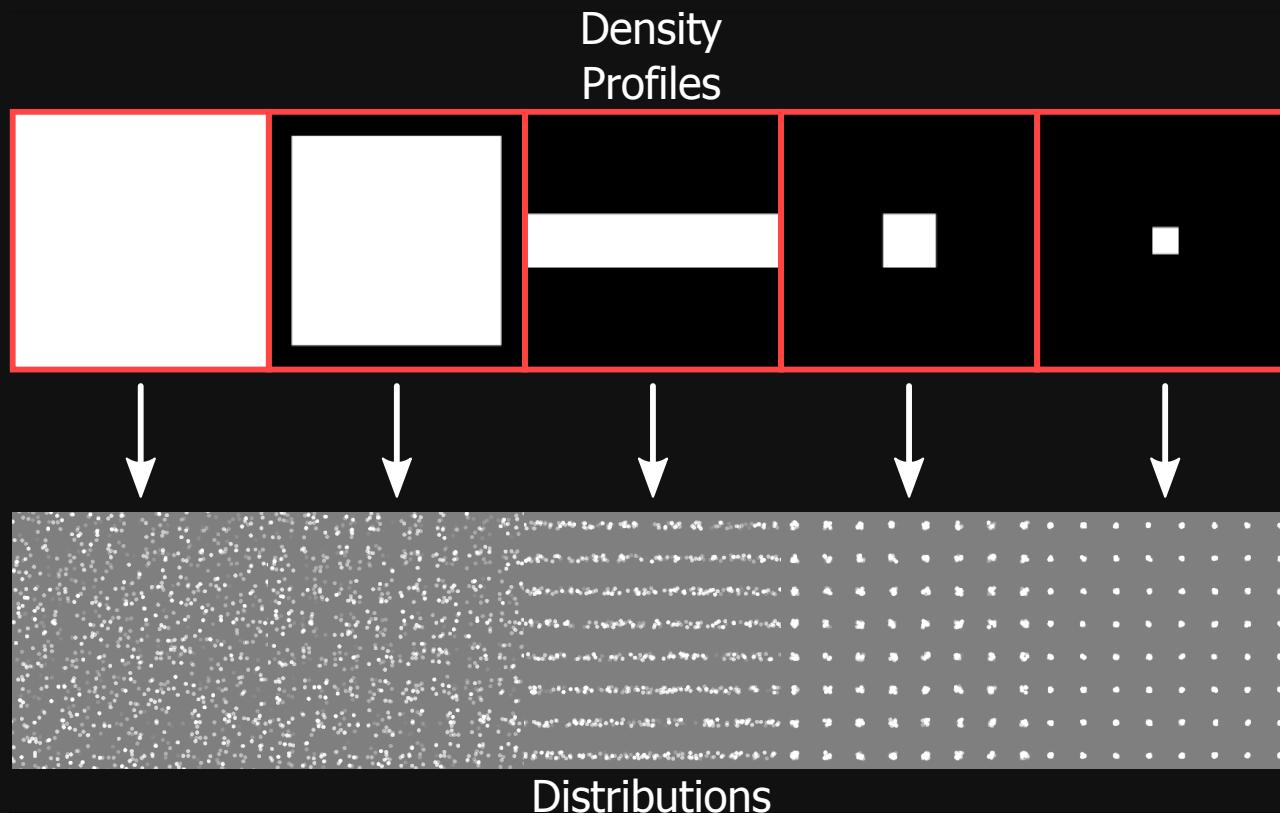
LOCALLY CONTROLLED SPOT NOISE DETAILS

- Ellipse fitting for kernel extraction



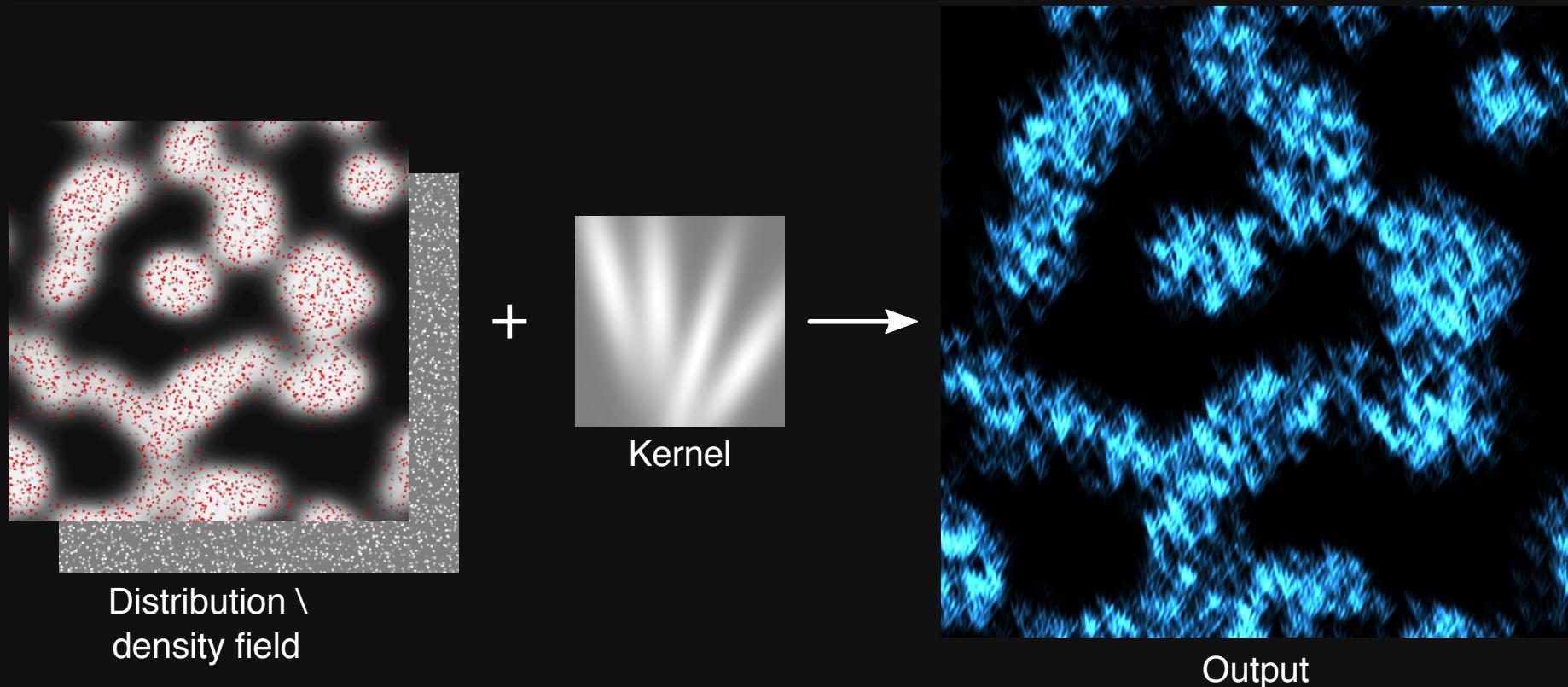
LOCALLY CONTROLLED SPOT NOISE DETAILS

- Local density functions (profiles)

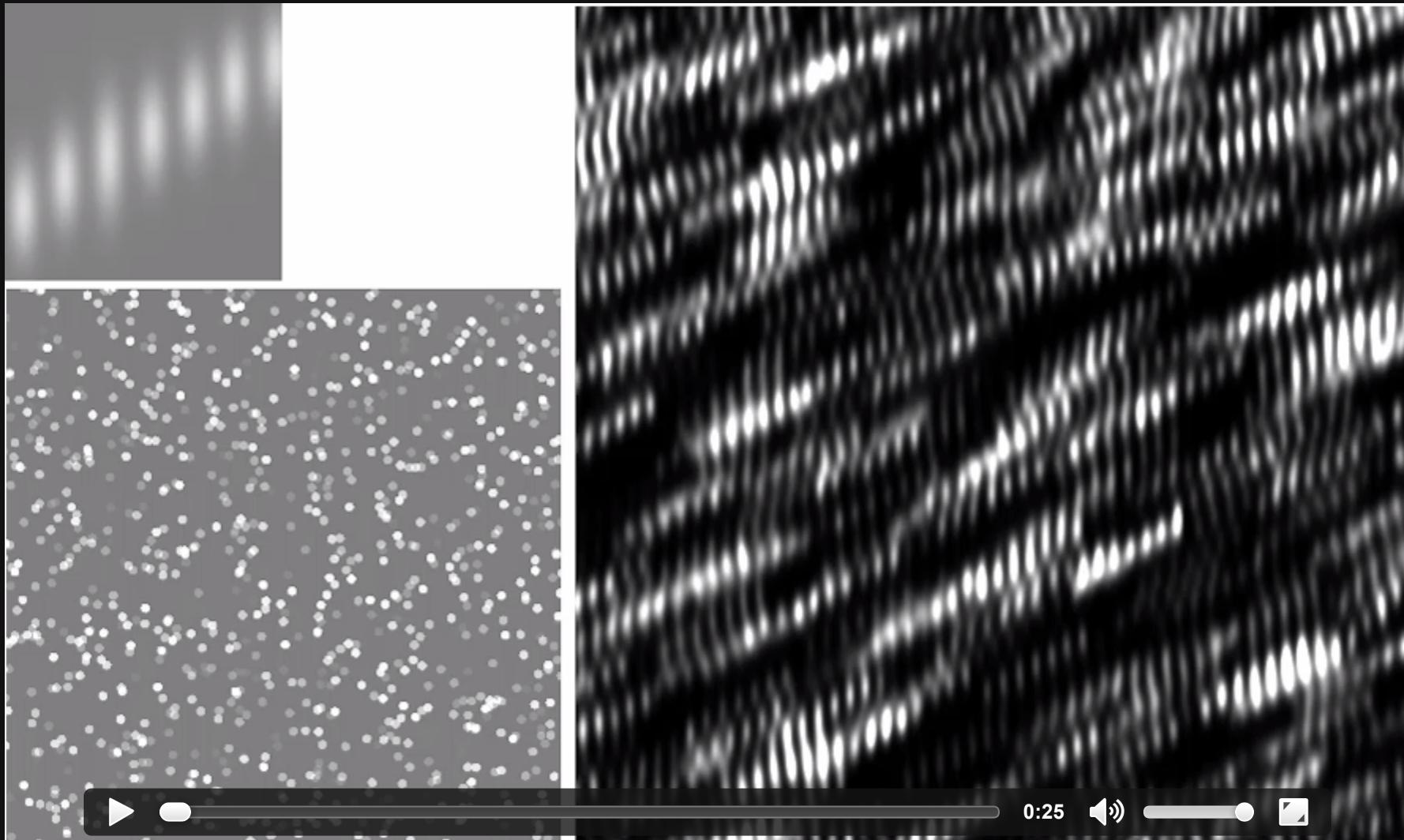


LOCALLY CONTROLLED SPOT NOISE DETAILS

- Global density functions (i.e. noises)

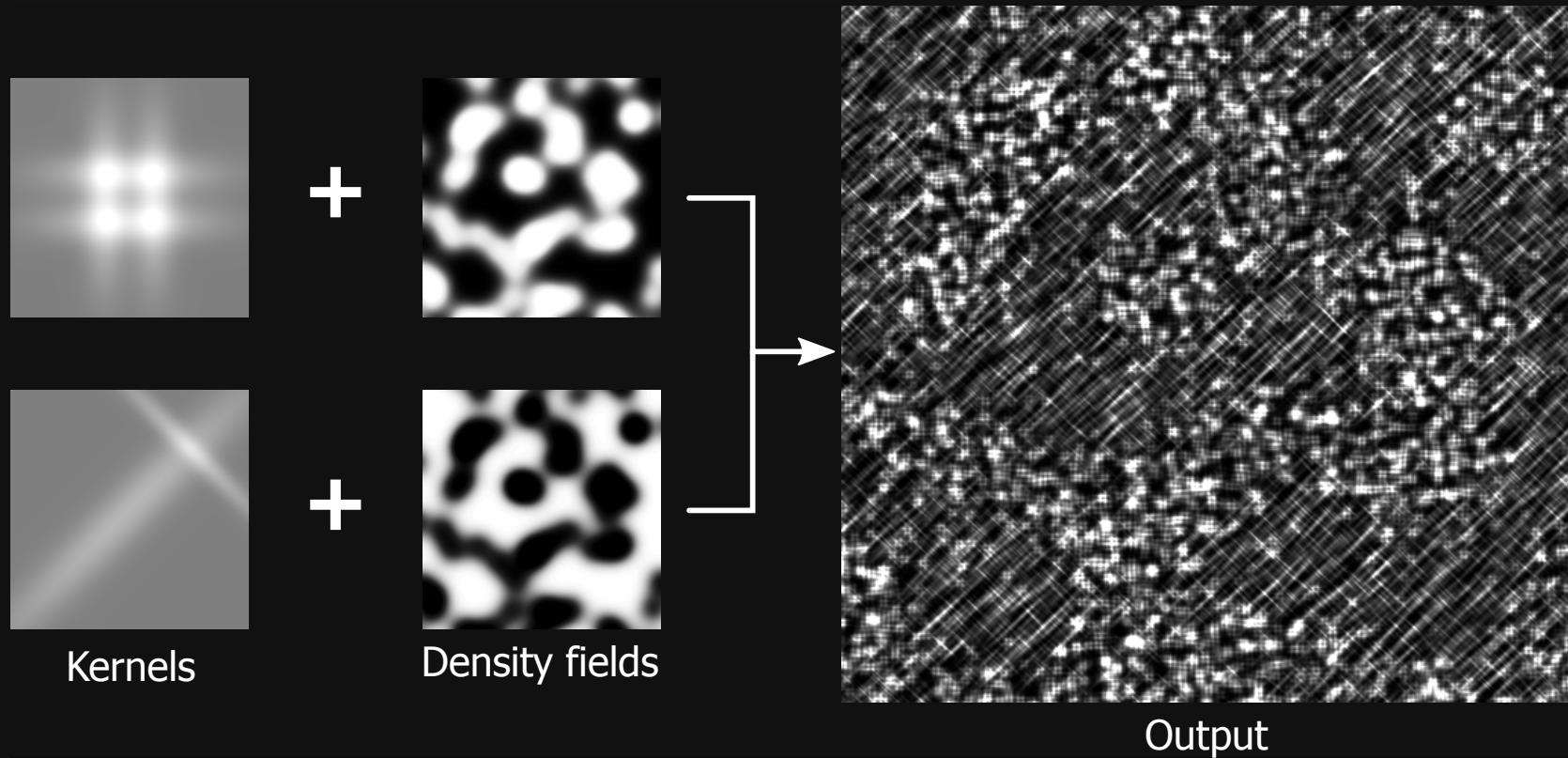


PATTERN EDITION EXAMPLE



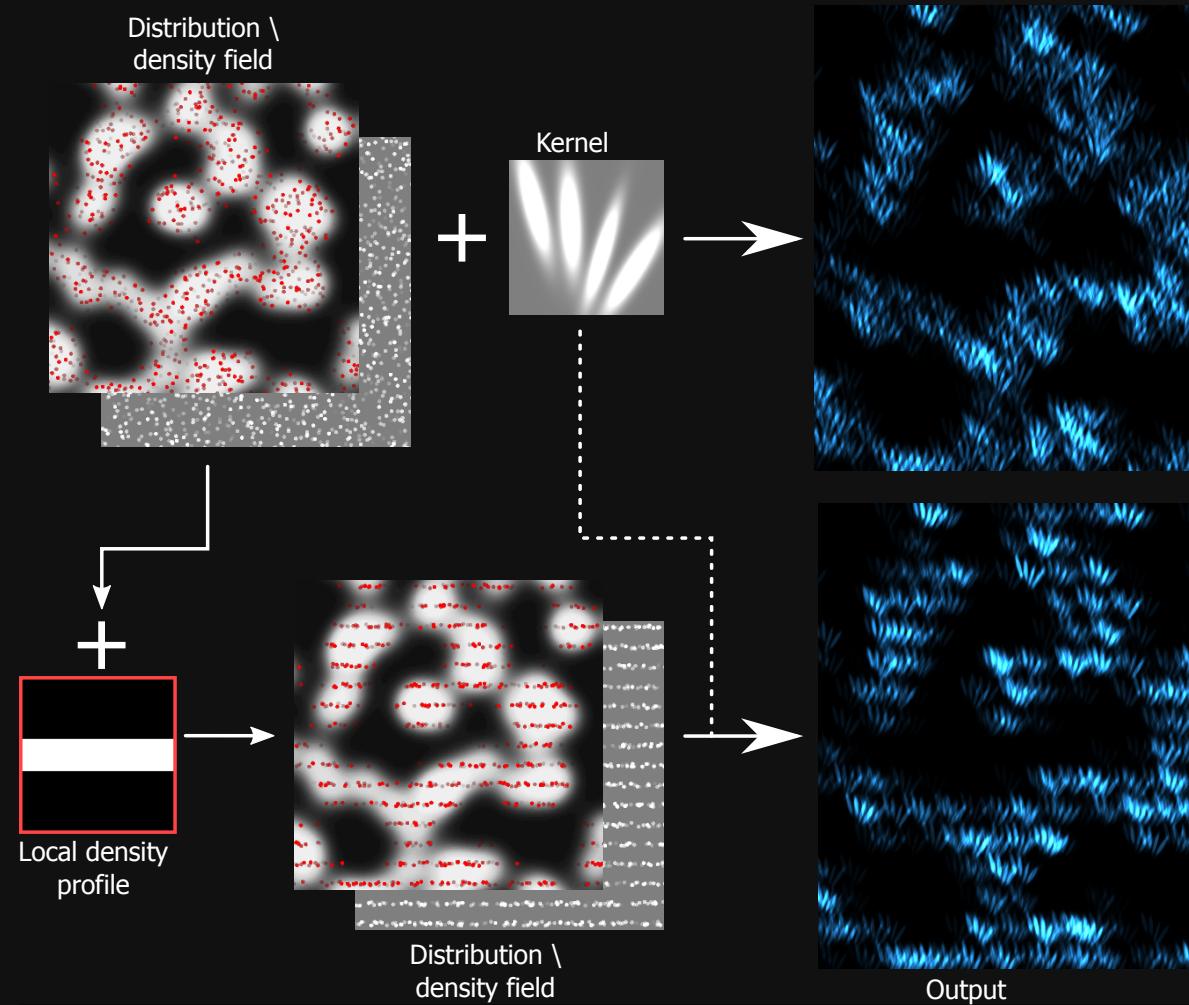
~45fps
Procedural Texture Synthesis by Locally Controlled Spot Noise - 5.1

MIXING NOISES



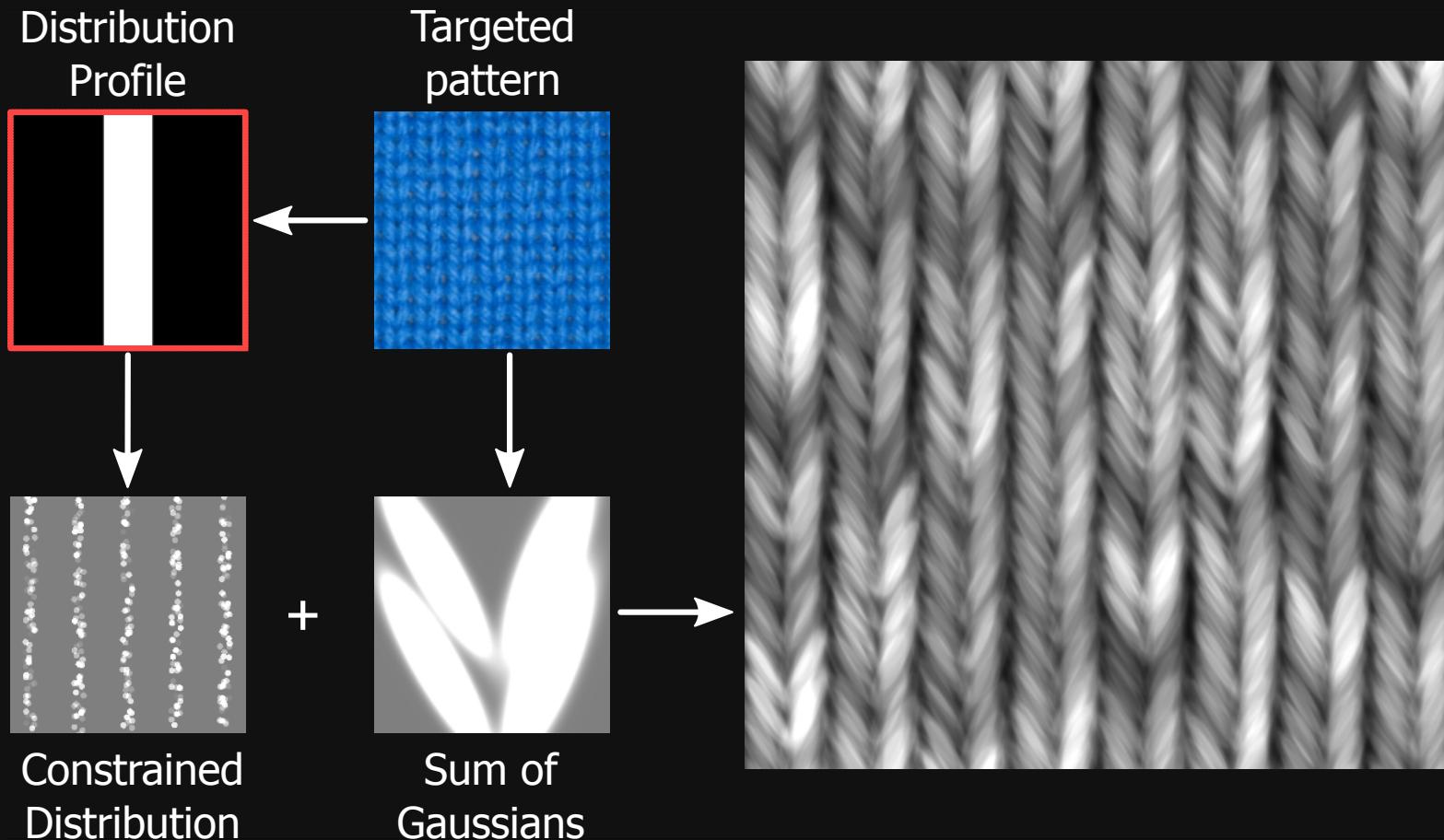
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MIXING DENSITIES



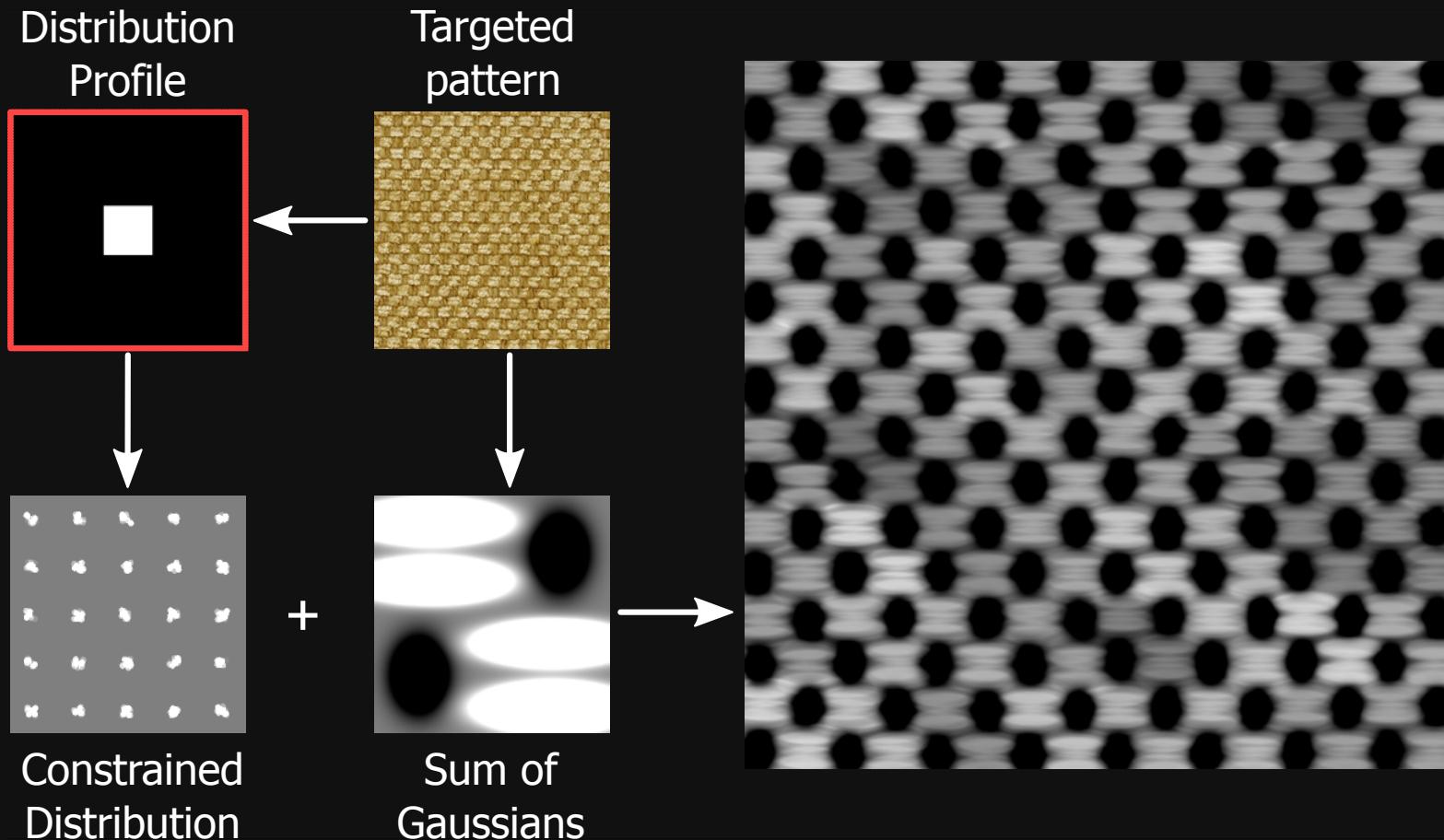
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RESULTS



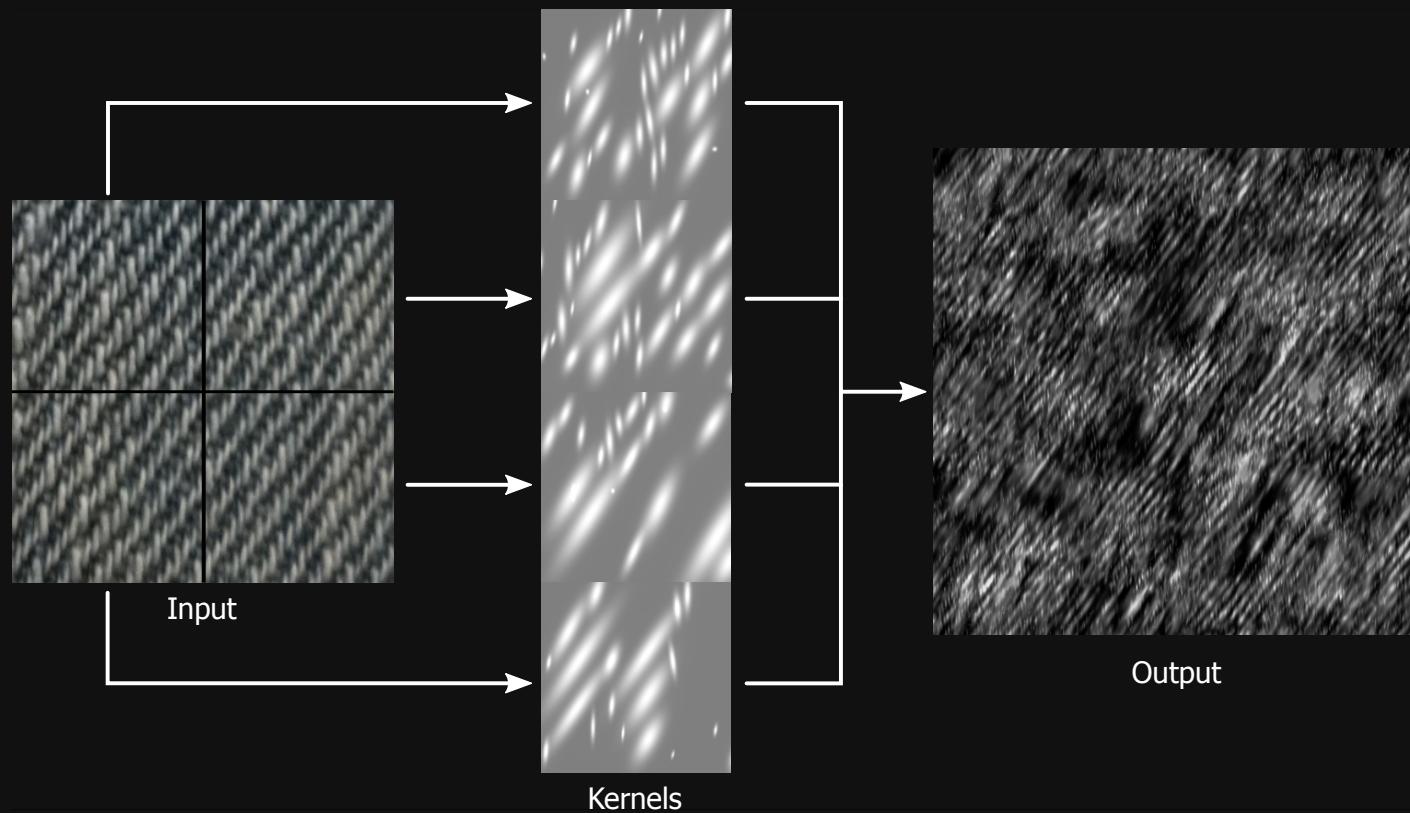
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RESULTS



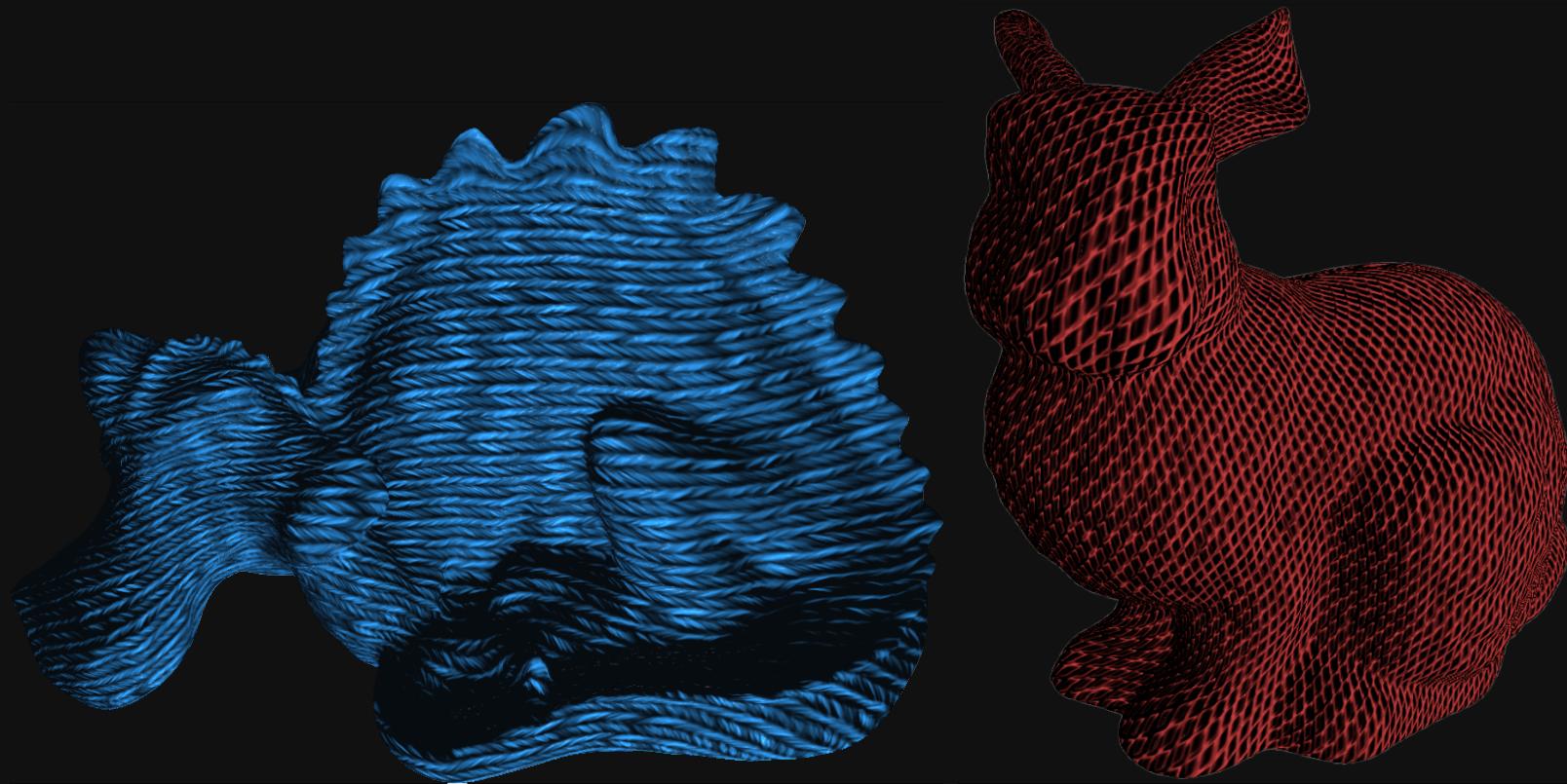
~45 fps

RESULTS



~10 fps

RESULTS



~20fps

LIMITATIONS

Complex features modeling

- High number of Gaussian functions
 - By example approach
 - Distribution is hard to extract

CONCLUSION

Getting back some control

- Local features edition
 - Spot based on Gaussian ellipses
- Pattern structure edition
 - Local density profiles
 - Global density fields

FUTURE WORKS

Improving by example approach

Better ellipse decomposition techniques

Extension to 3D

Shell texture editions
3D texture synthesis by example

**THANK YOU
FOR YOUR ATTENTION**