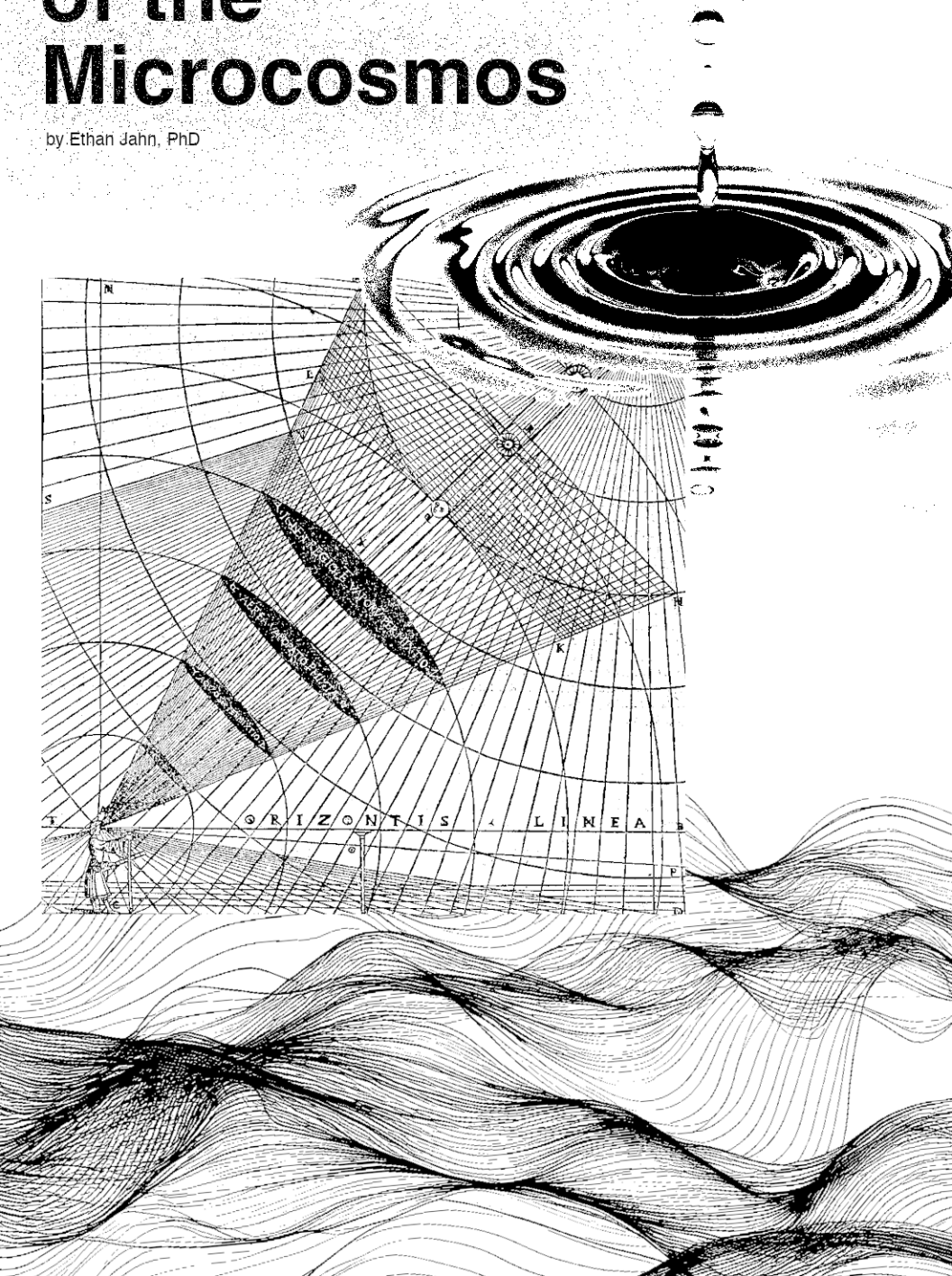
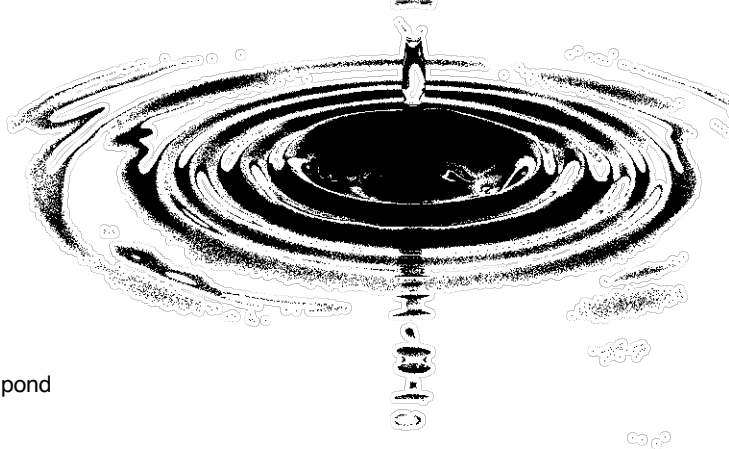
Macrostructures of the Microcosmos

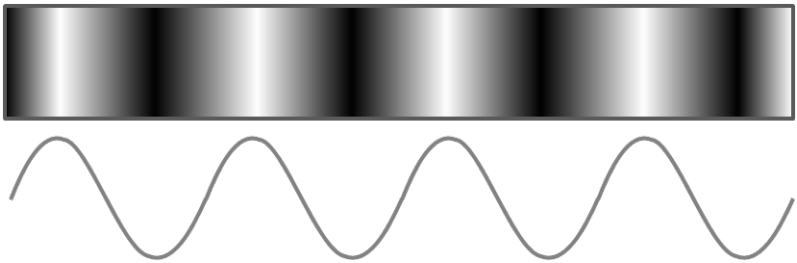
by Ethan Jahn, PhD



a pebble



dropped in a pond

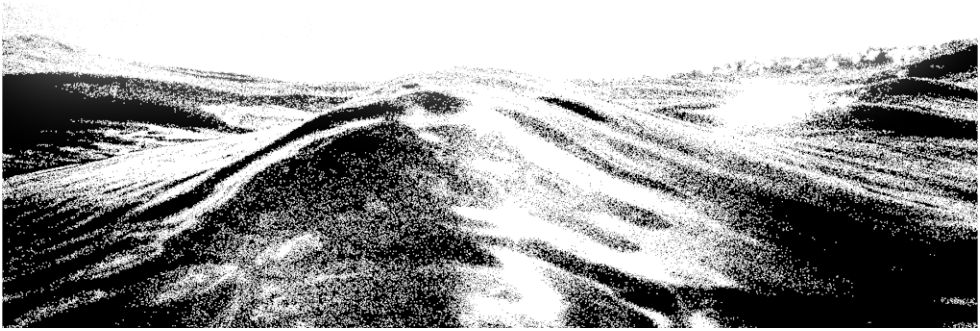


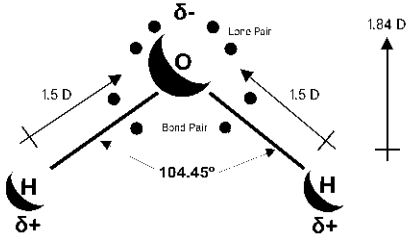
forces between those miniscule

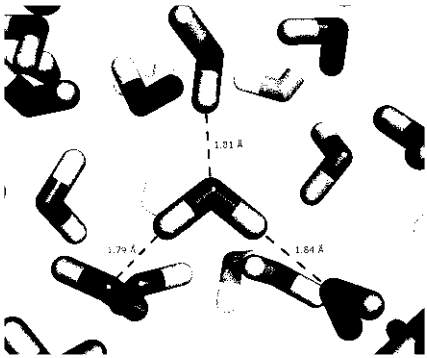
yet monumental

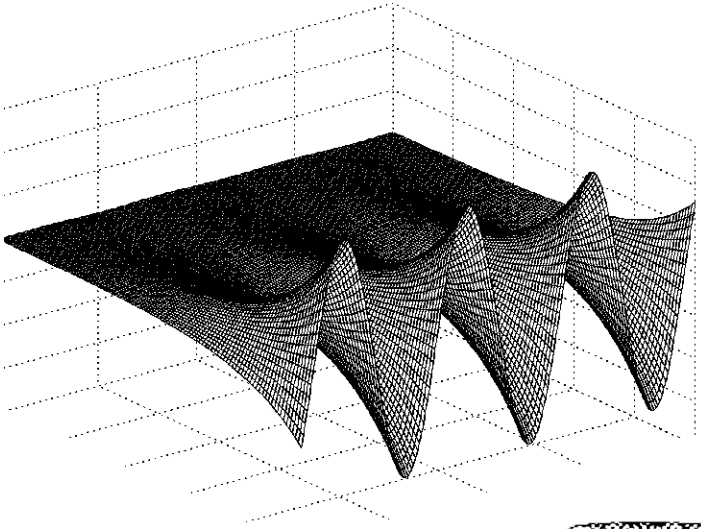
molecular beings

form waves







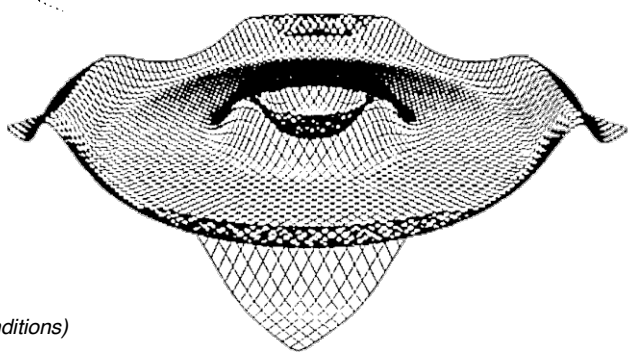


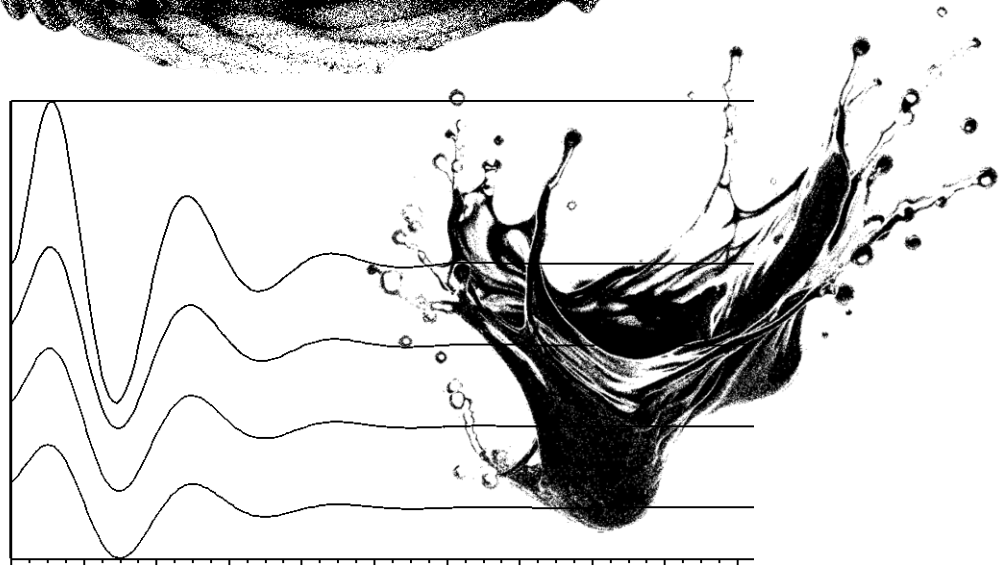
amplitude *(growth)*

period *(waits for)*

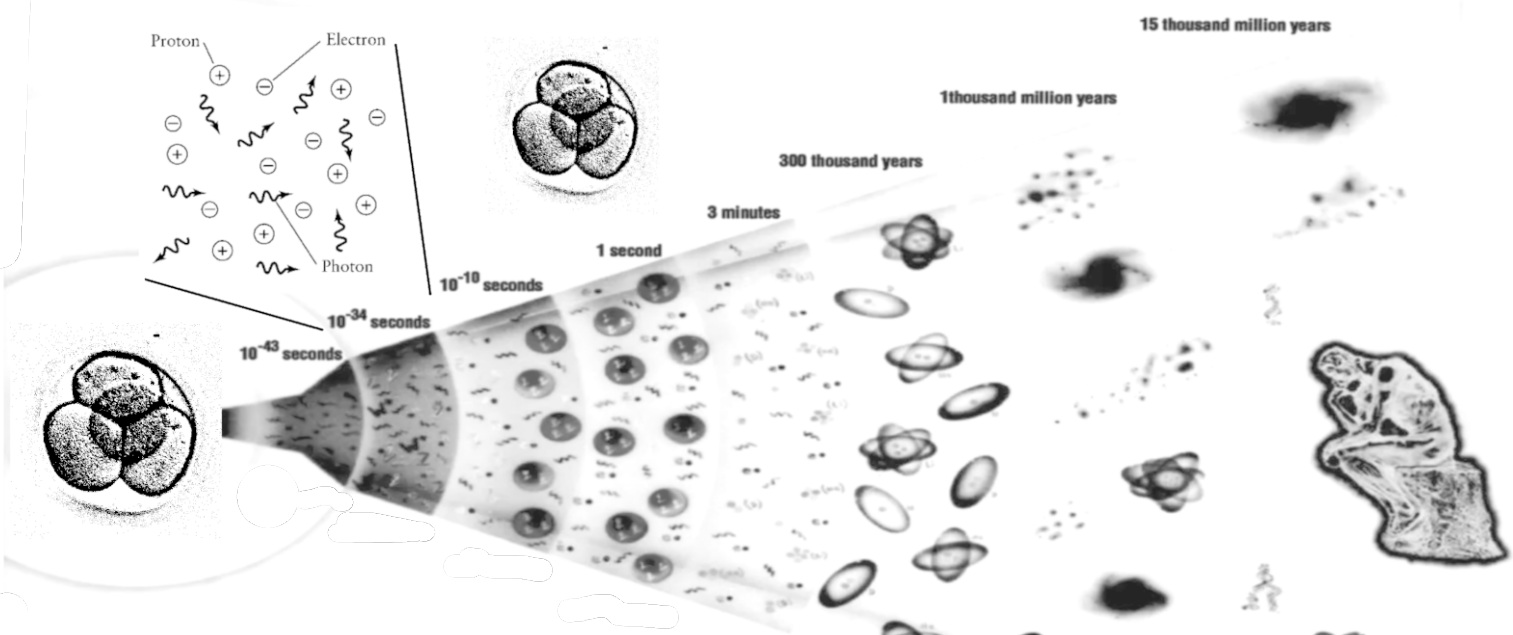
velocity *(fertile)*

wavelength *(conditions)*






complexity
emerges
from
simple
ingredients

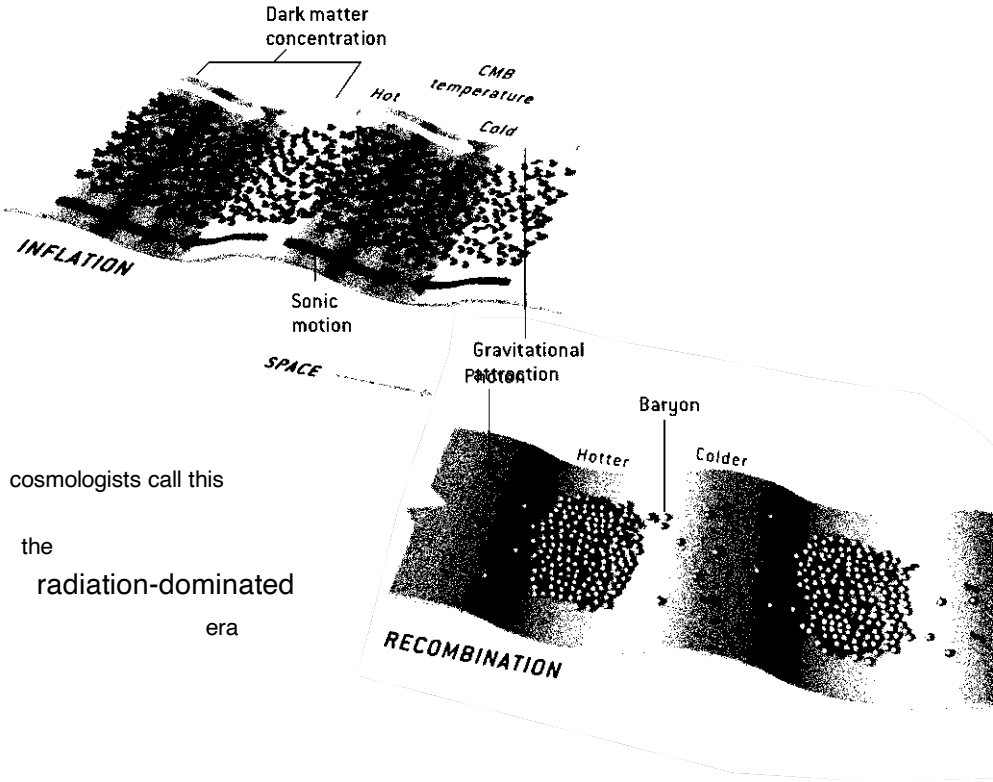


when the universe was just an embryo

just like an embryo it was tiny, undeveloped,
primitive,
full of potential

(unlike an embryo)
it was thousands of times more compact than our current universe

and it was full of a hot, dense plasma
made of protons, electrons, and photons
(these are sometimes referred to as baryons)



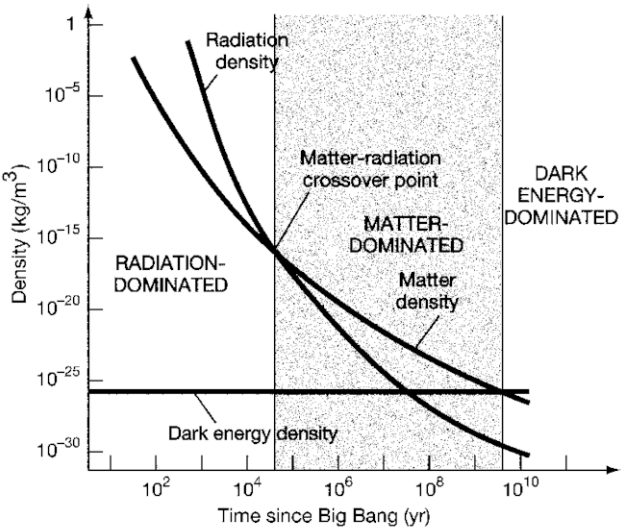
cosmologists call this

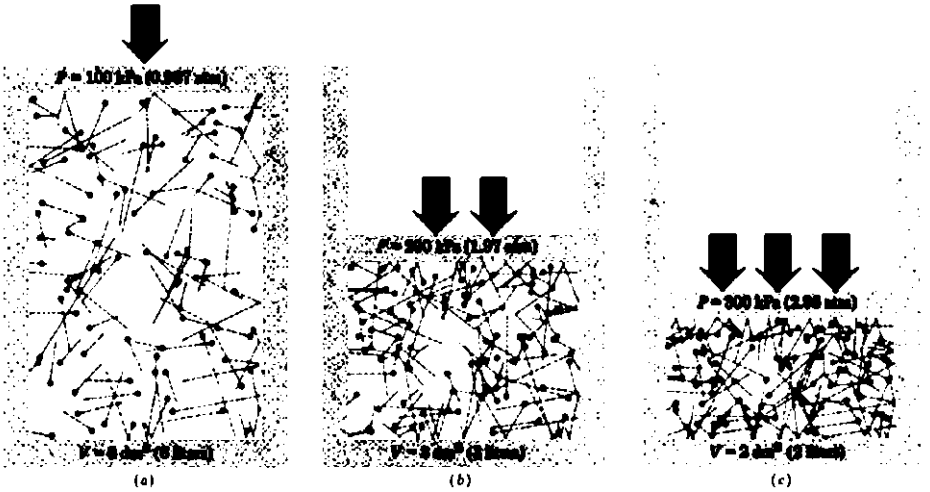
the

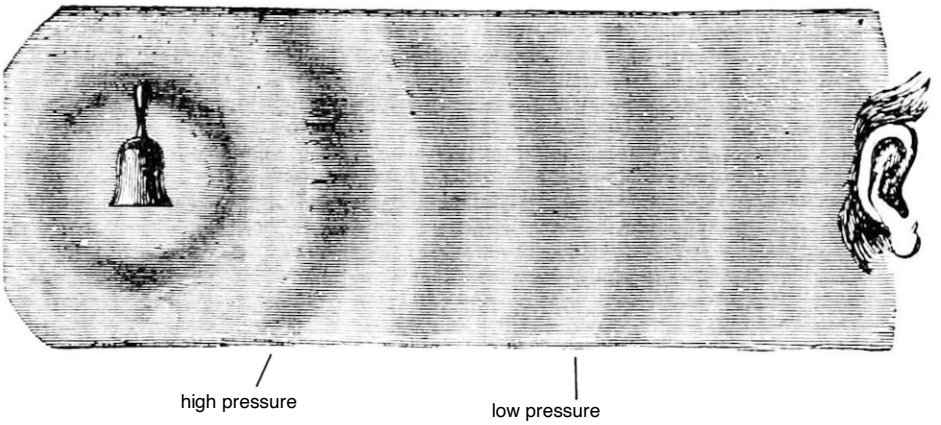
radiation-dominated

era

when light was more dense than matter



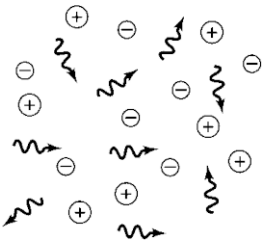




pressure increases when collisions are commonplace

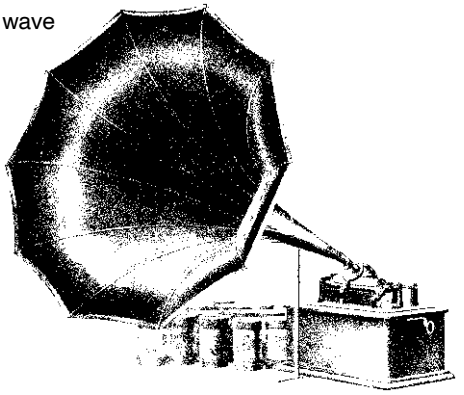
oscillations between compression and rarefaction

travel through space (and time) as a wave



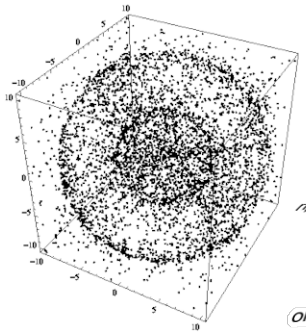
that we call

sound

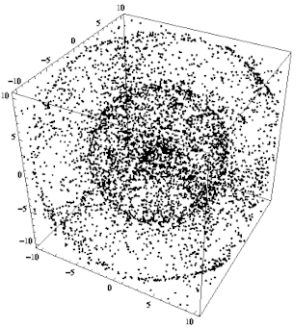


just

like



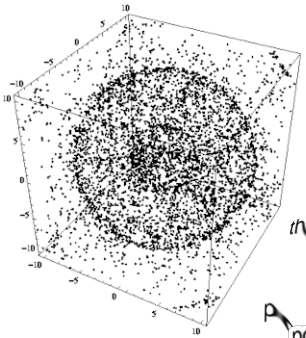
ripples



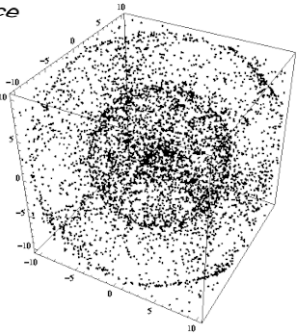
on

the

surface

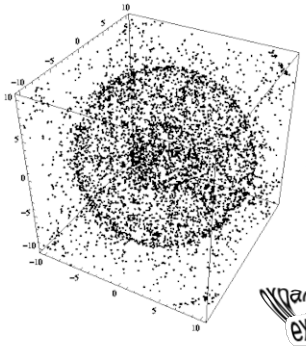


of

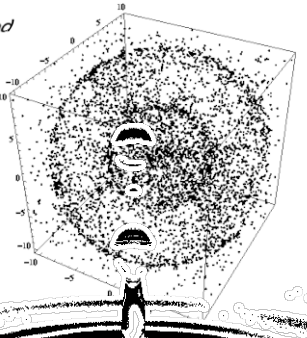


the

pond



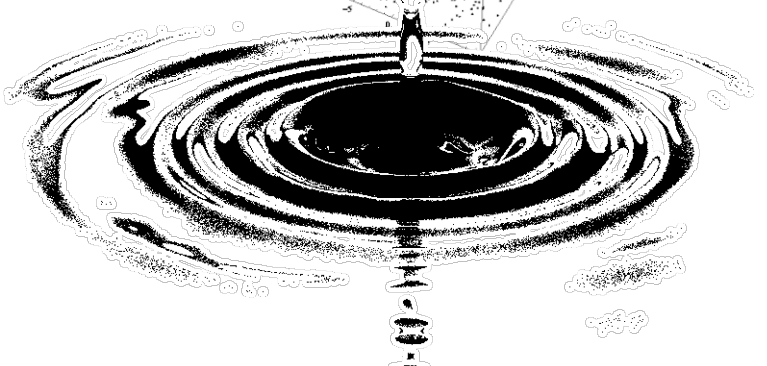
sound

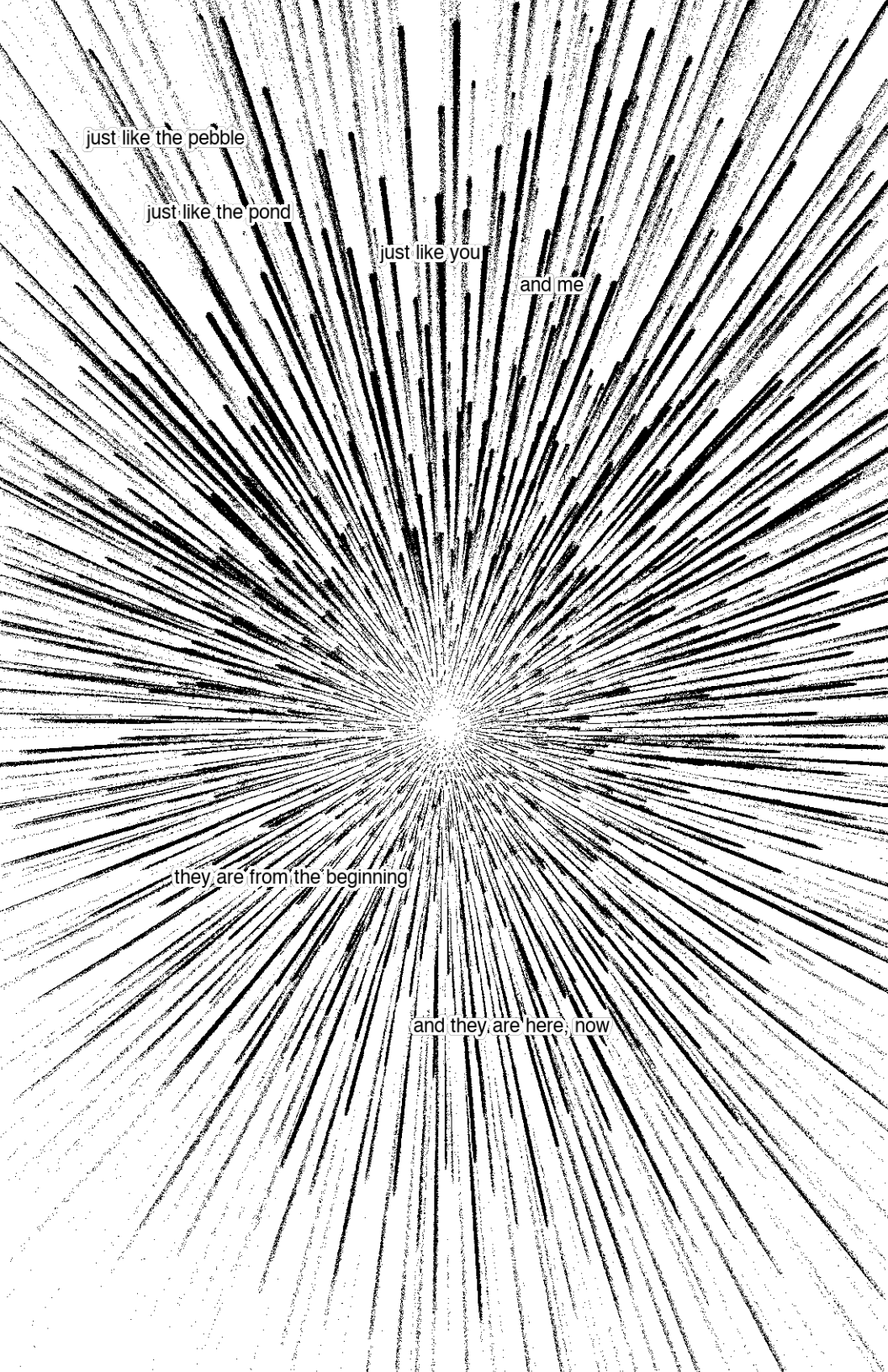


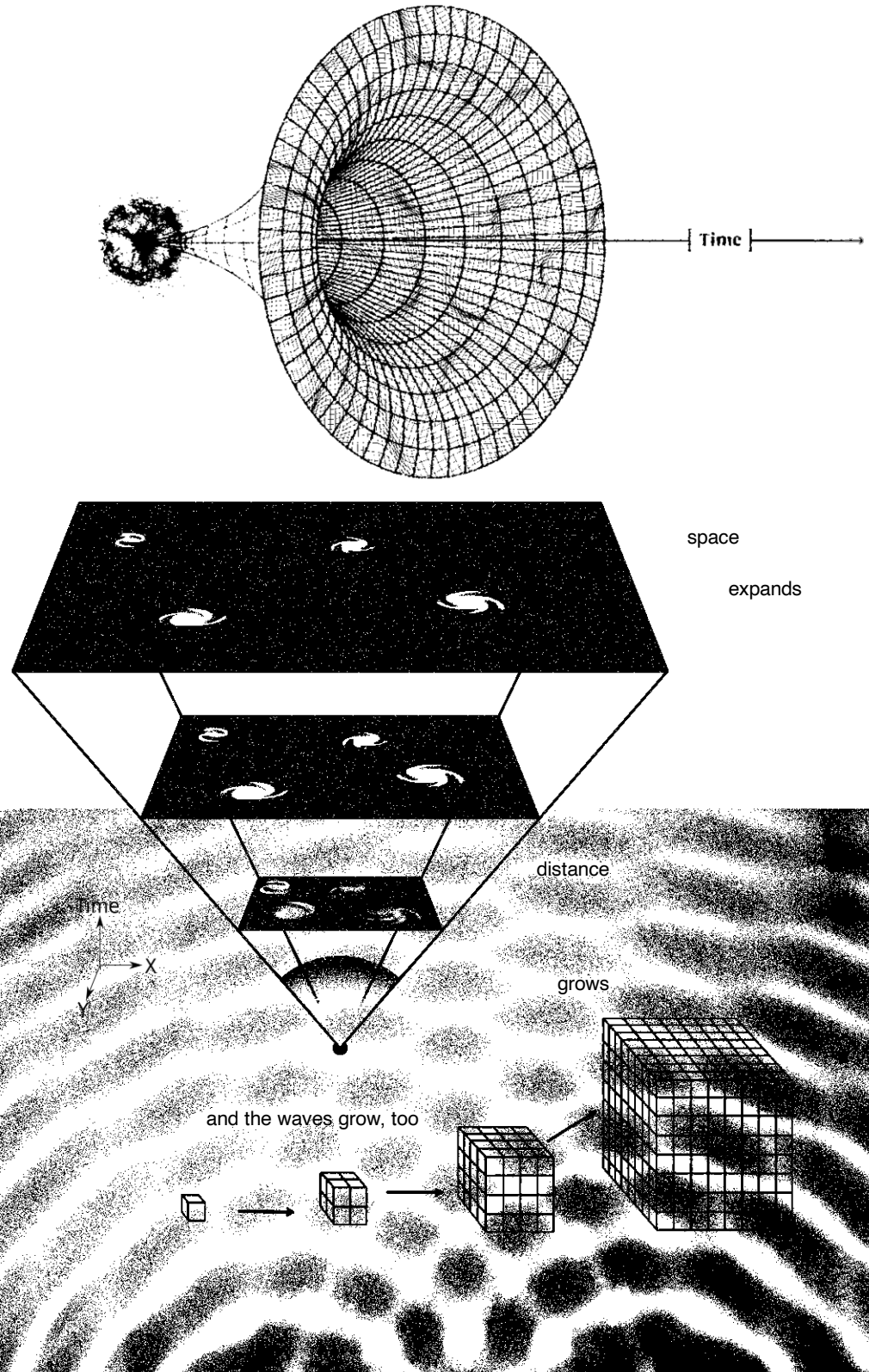
waves

expand

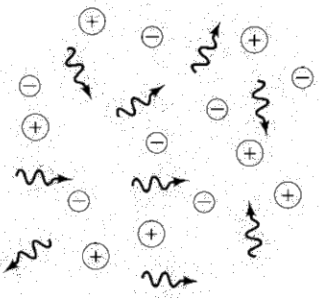
outwards




just like the pebble
just like the pond
just like you
and me
they are from the beginning
and they are here, now

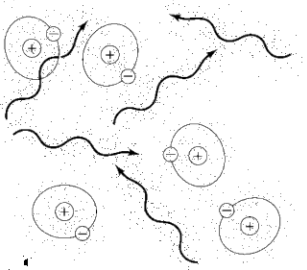

Time
space
expands
distance
Time
X
Y
grows
and the waves grow, too

like a cloud dissipating



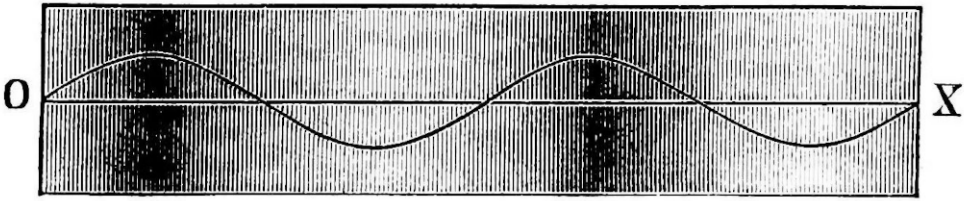
the dense fog of the early universe

becomes clear



and reveals itself

to those who look

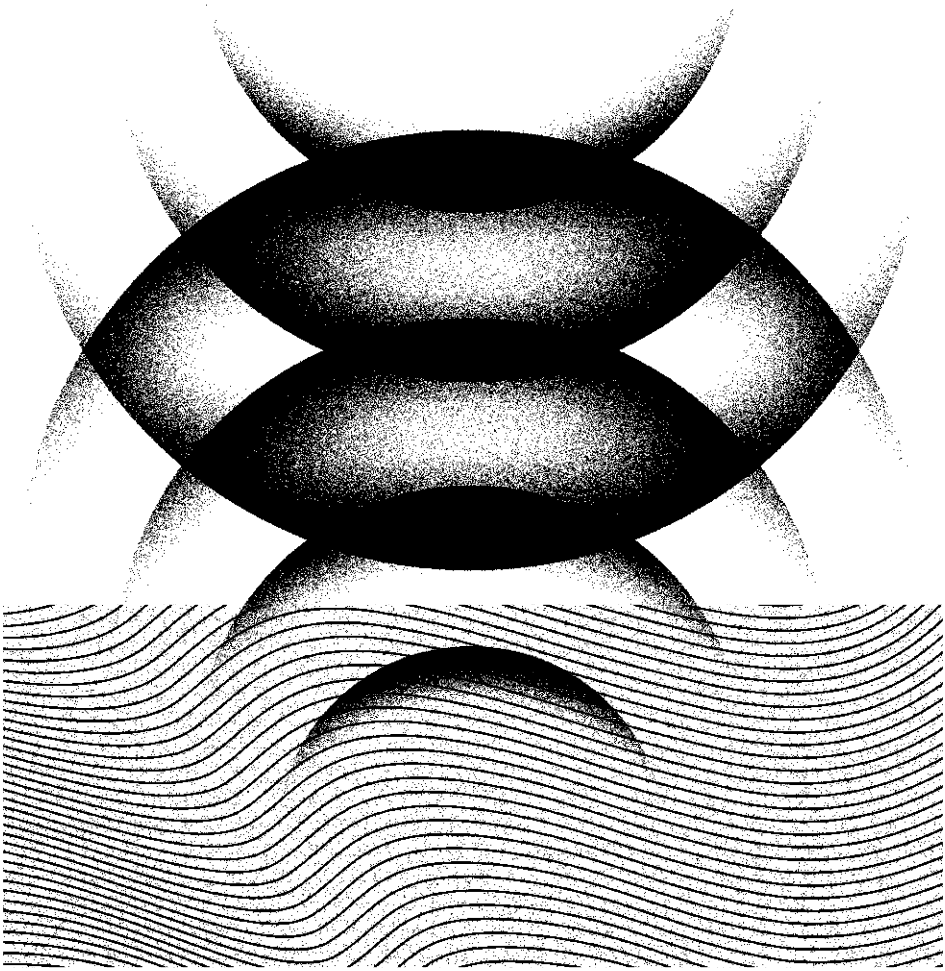


(what) matter*(s)* becomes frozen in place

the imprint remains

features once too small to notice

become magnified to grand proportions

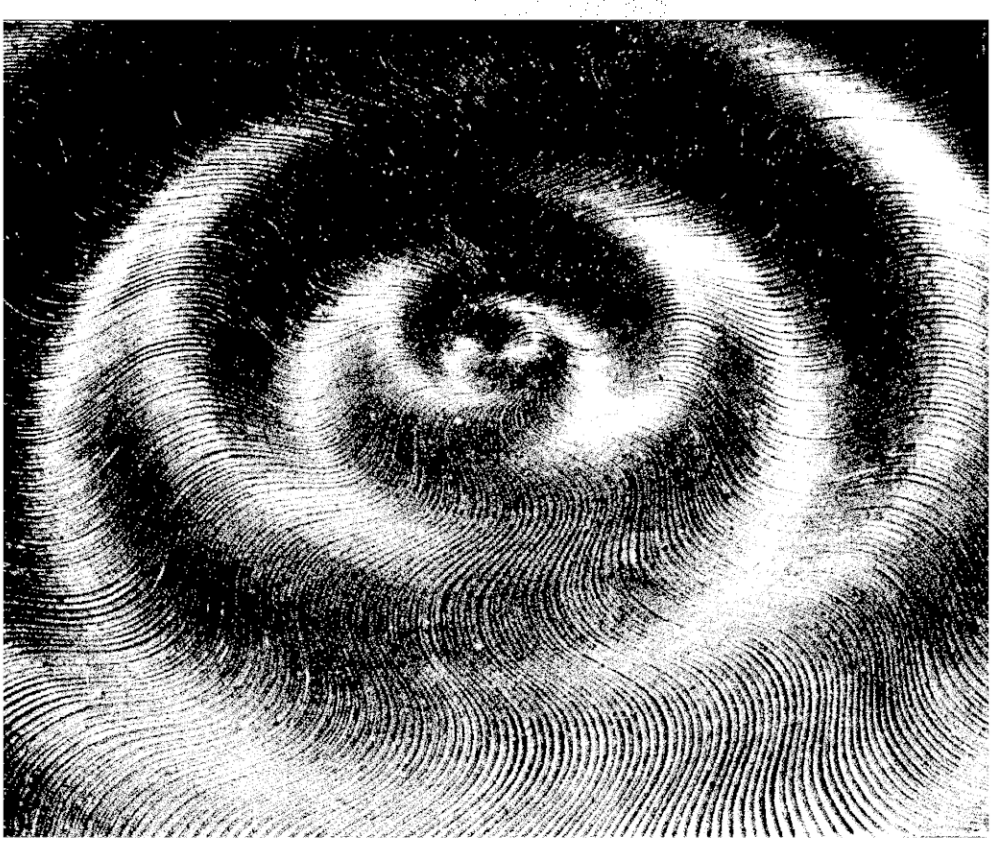


cosmic waves

from the dawn of time

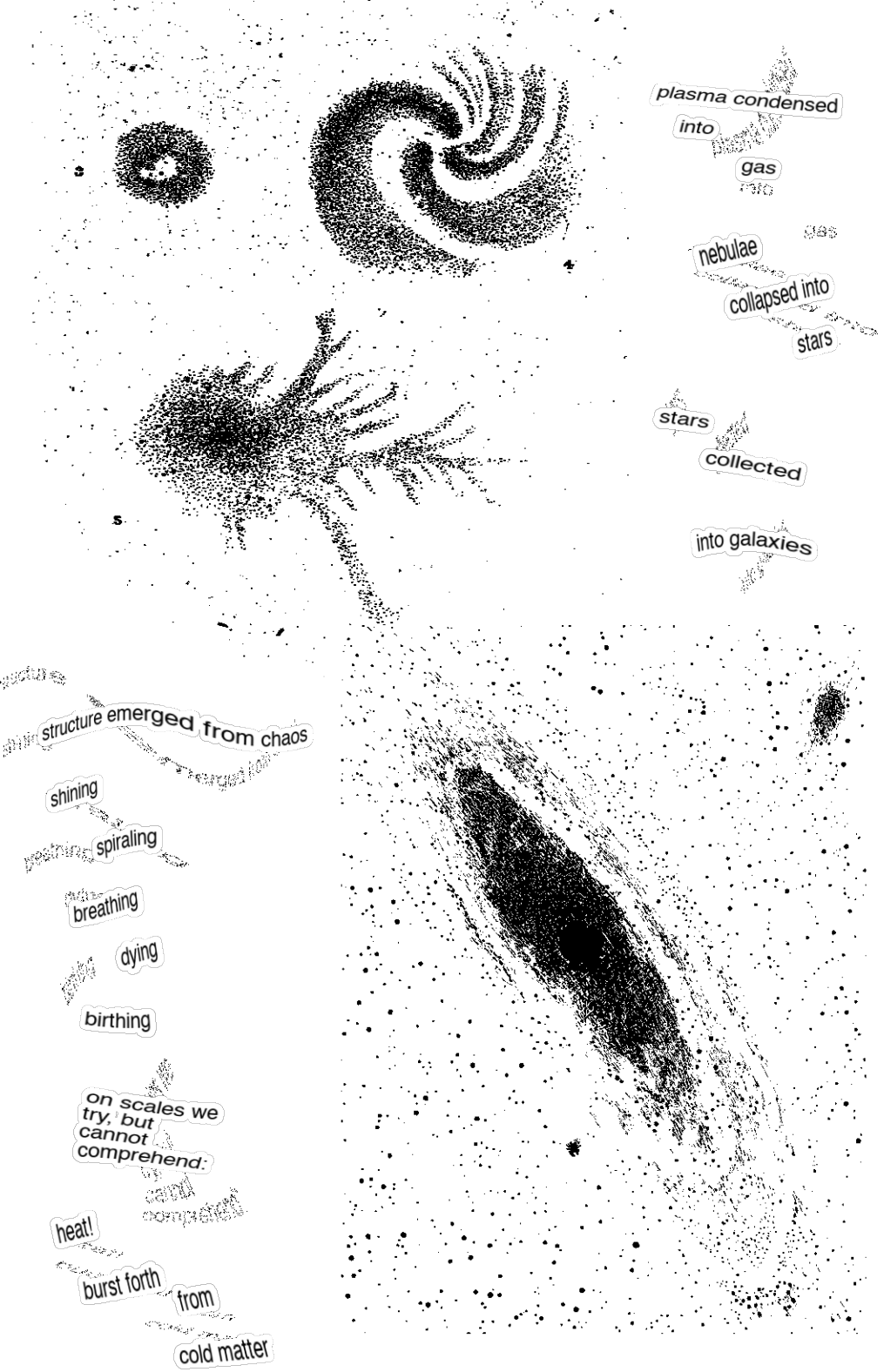
frozen in relative place

dancing in lock step



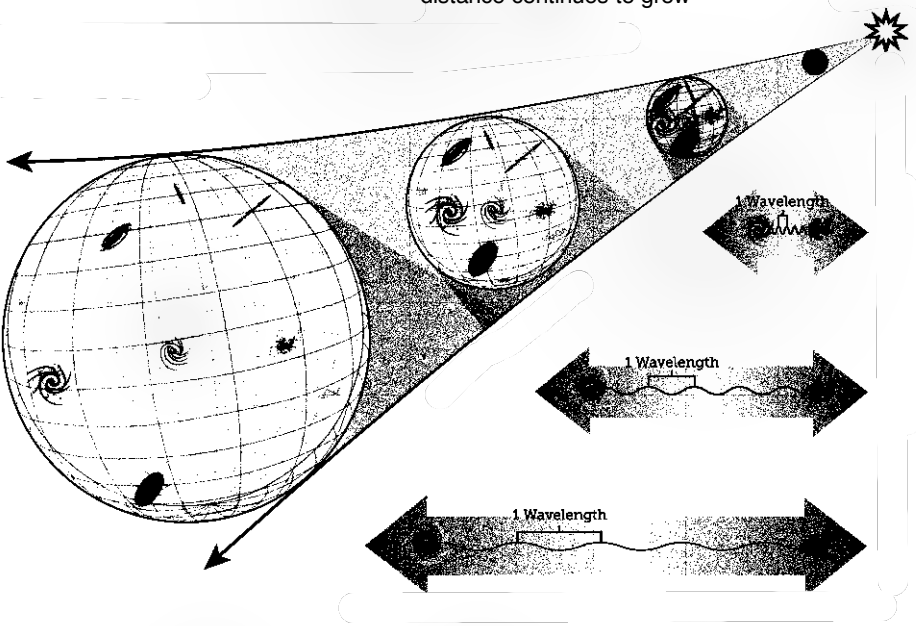
shape the structure

of our universe


plasma condensed
into
gas
nebulae
collapsed into
stars
stars
collected
into galaxies
structure emerged from chaos
shining
spiraling
breathing
dying
birthing
on scales we
try, but
cannot
comprehend:
heat!
burst forth
from
cold matter

space continues to expand

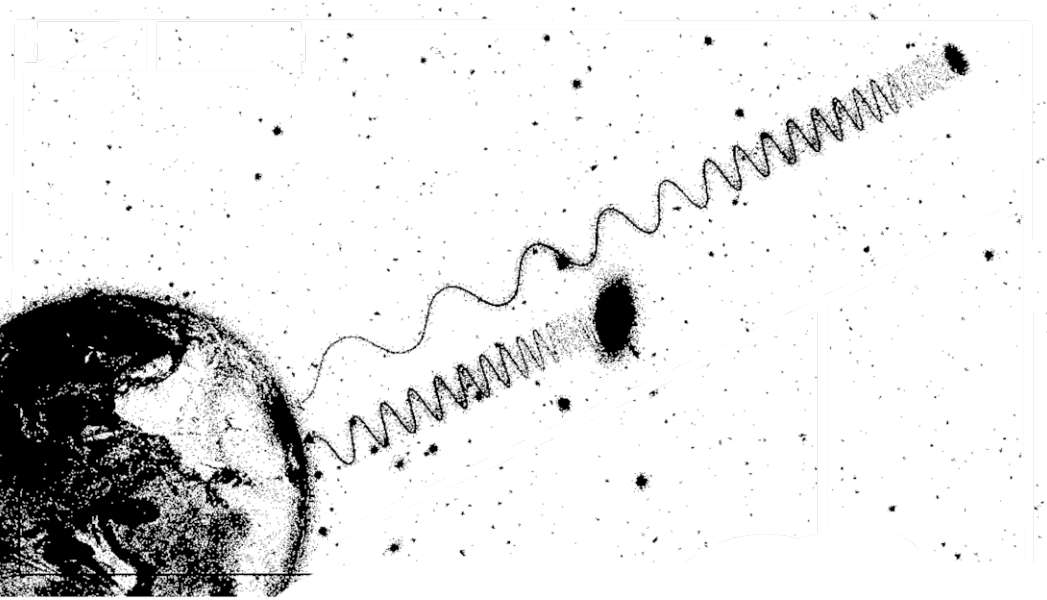
distance continues to grow



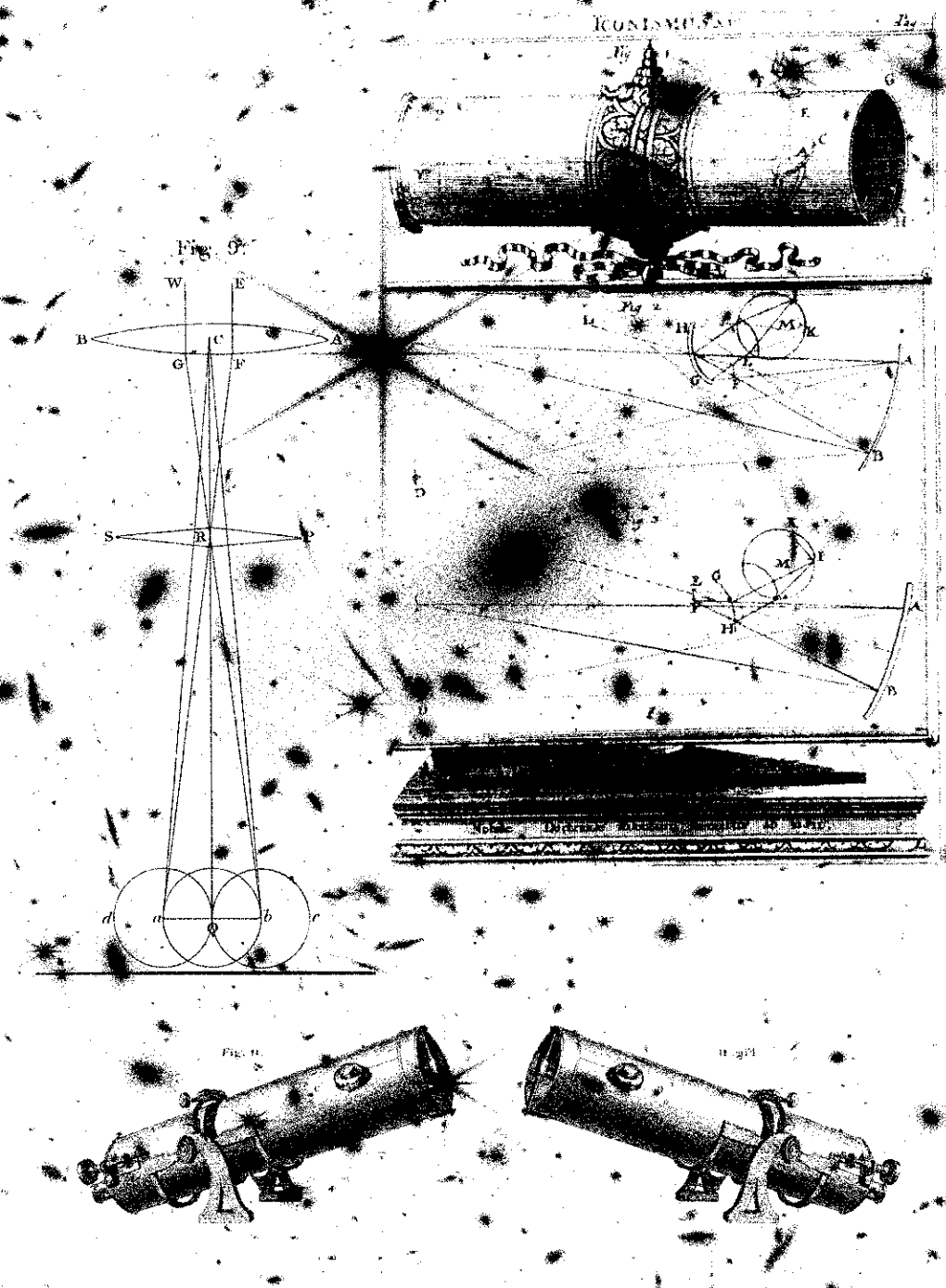
light becomes longer

redder

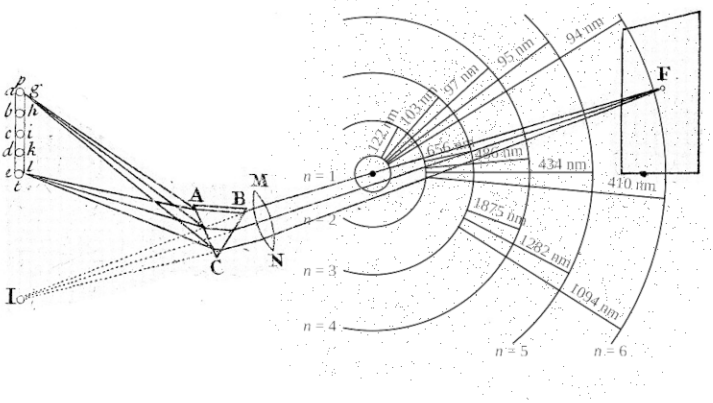
lower energy



we started counting galaxies



the structure of atoms
described by quantum mechanics
gives each element
a unique spectral signature

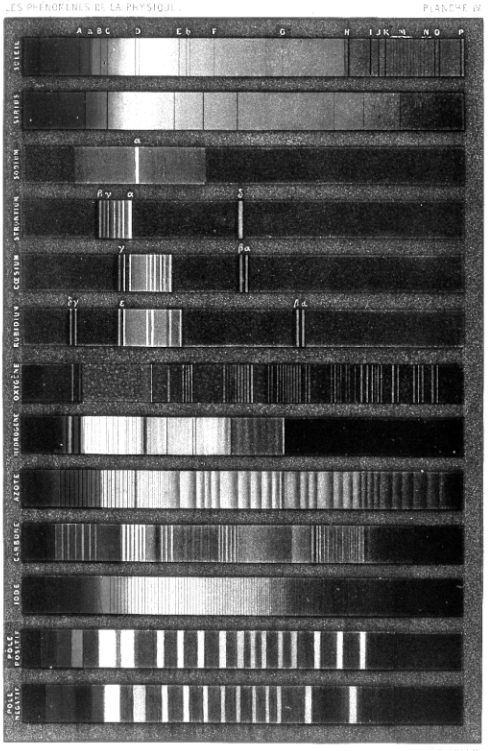


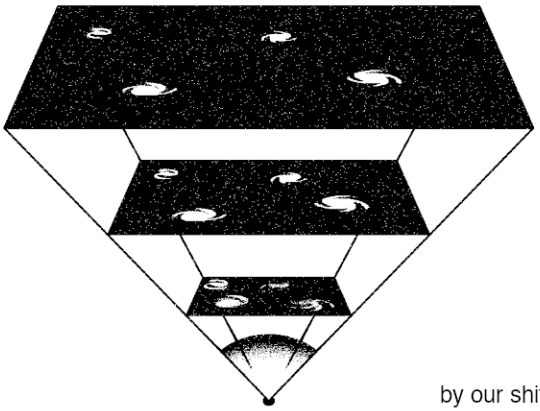
iidentities revealed when

starlight is

split

apart

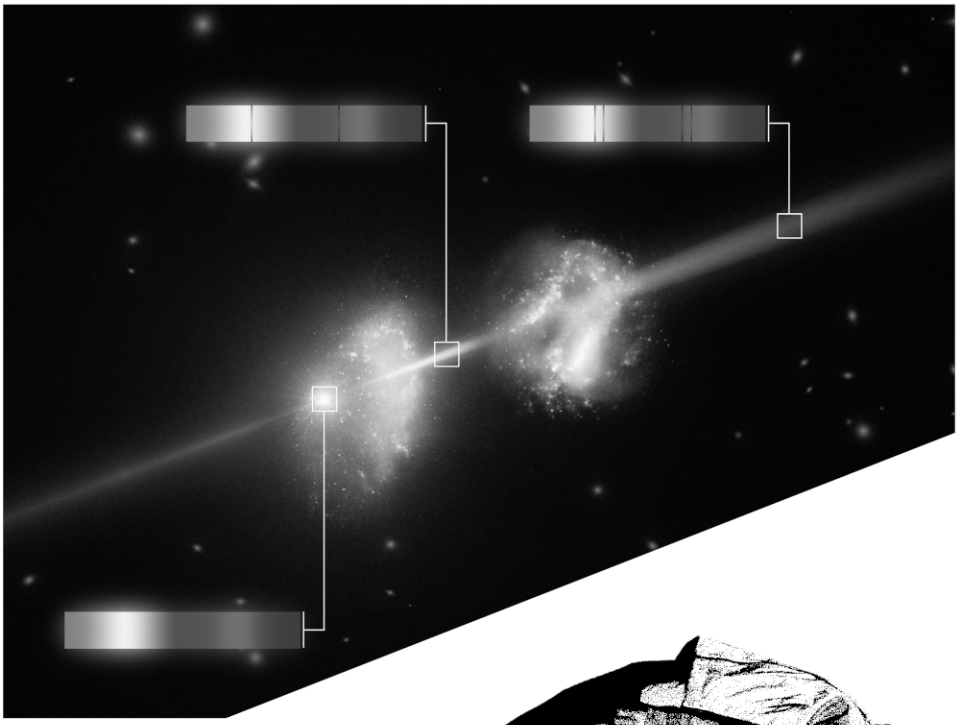


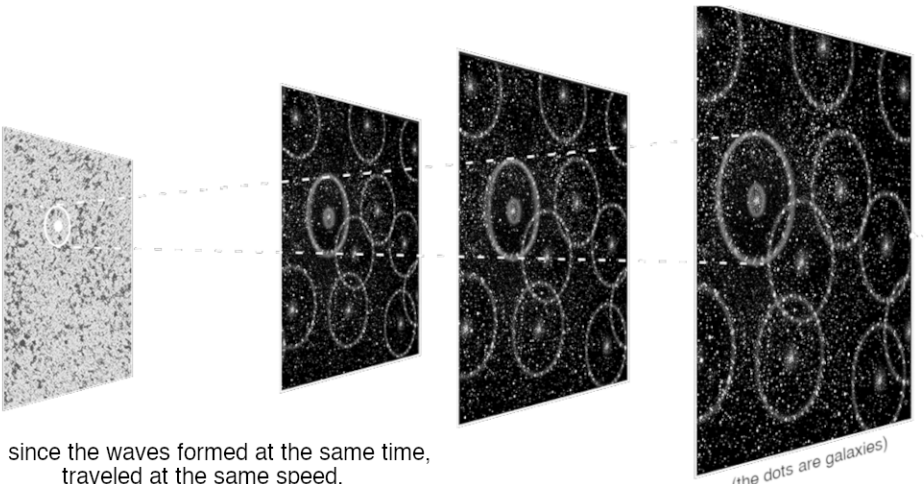


how far we've come

is told by

by our shifting spectra





since the waves formed at the same time,
traveled at the same speed,
and froze in place at the same moment..

the rings they form are all the same size.

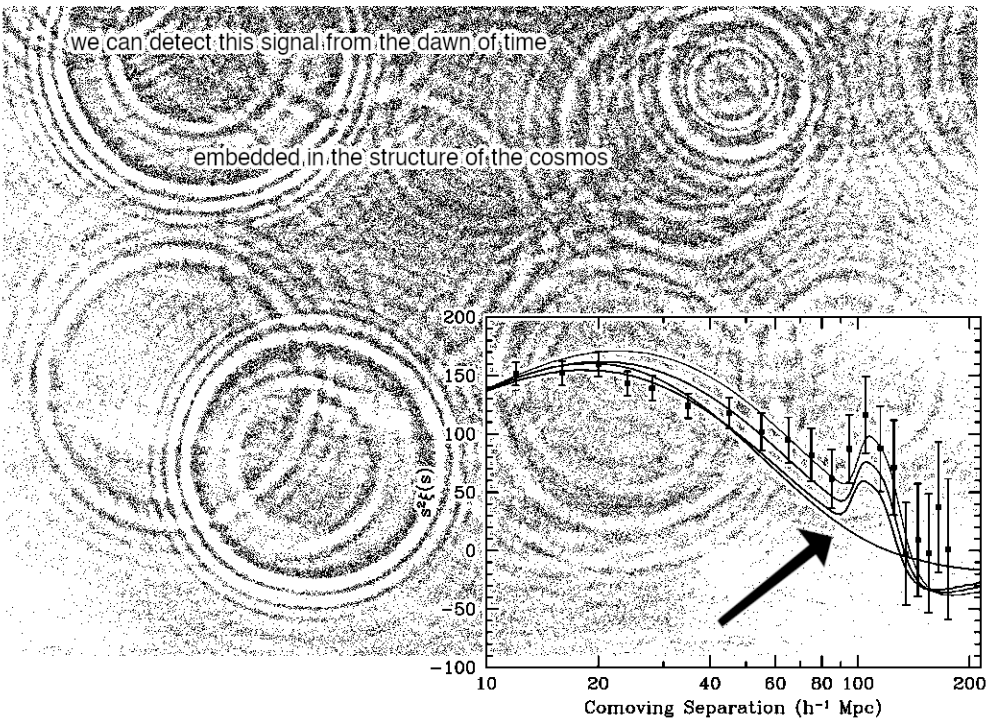
when a few more galaxies than expected

are found at this distance from each other

(with a bit of statistics)

we can detect this signal from the dawn of time

embedded in the structure of the cosmos



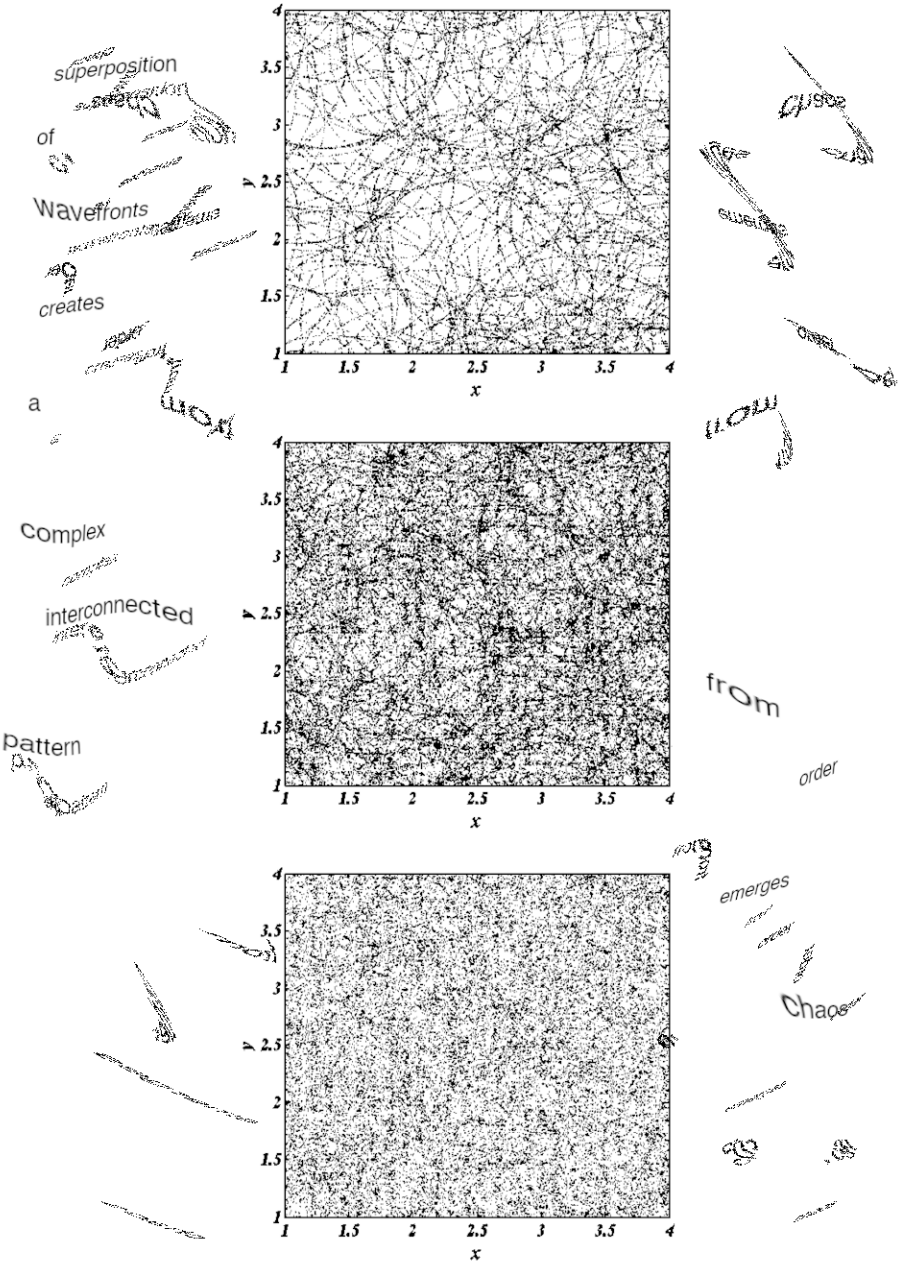
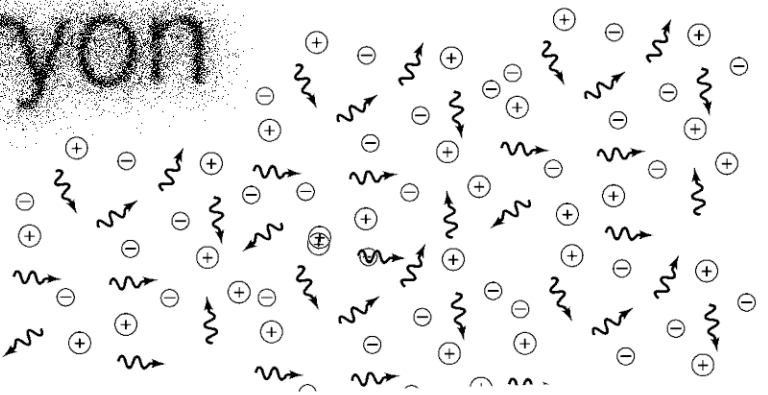
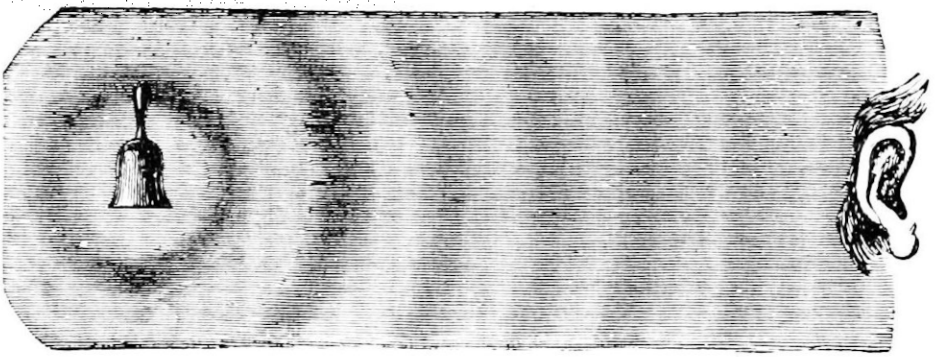


Fig. 1.17. Hiding the characteristic scale. The underlying rings of power are lost, and must be recovered statistically. The number of points are kept the same in each panel.

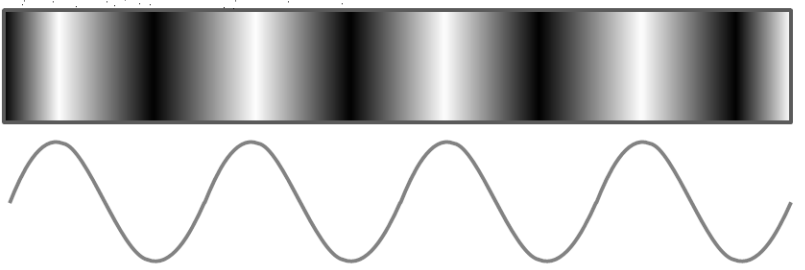
baryon



acoustic



oscillations



do you hear it?

we've seen the sound of creation

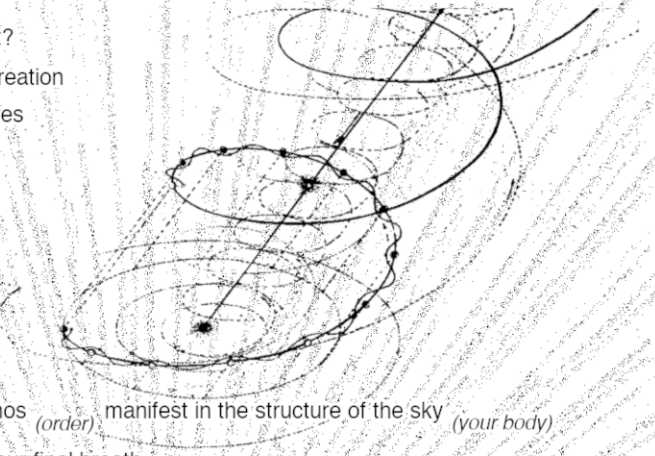
with our bleeding mechanical eyes

it tells me

it whispers

it shouts

in broken, chaotic bursts



I am the beginning, I am now

I am the law of the cosmos *(order)* manifest in the structure of the sky *(your body)*

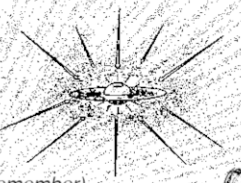
I am your earliest memory your final breath I am now

I am cycles I am death I am clouds

I wait for you

to notice me

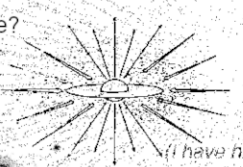
I have hidden myself in the sky

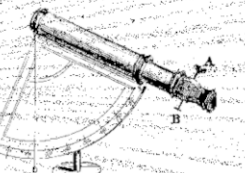


I am patient

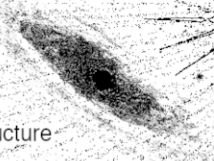
but do you have time? *(remember)*

notice...





(I have hidden myself in the sky)



like order

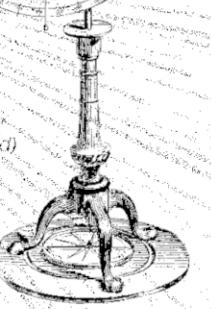
like structure

(like chaos)

like water like signal

like distance like noise

(like wind)



from simplicity

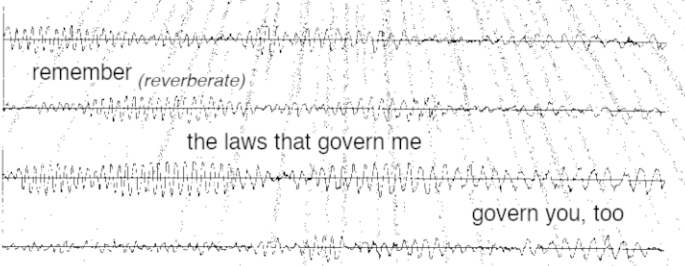
emerges complexity

we are grown

we are known and *(re)*turn to matter

we gather

and *(re)*turn to ether



references

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Baryon Acoustic Oscillations - Bassett & Hlozek - *Dark Energy: Observational and Theoretical Approaches, Cambridge University Press, 2010*

image attributions

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ARTISTIC EXPRESSION OF ORIGINAL RESEARCH
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