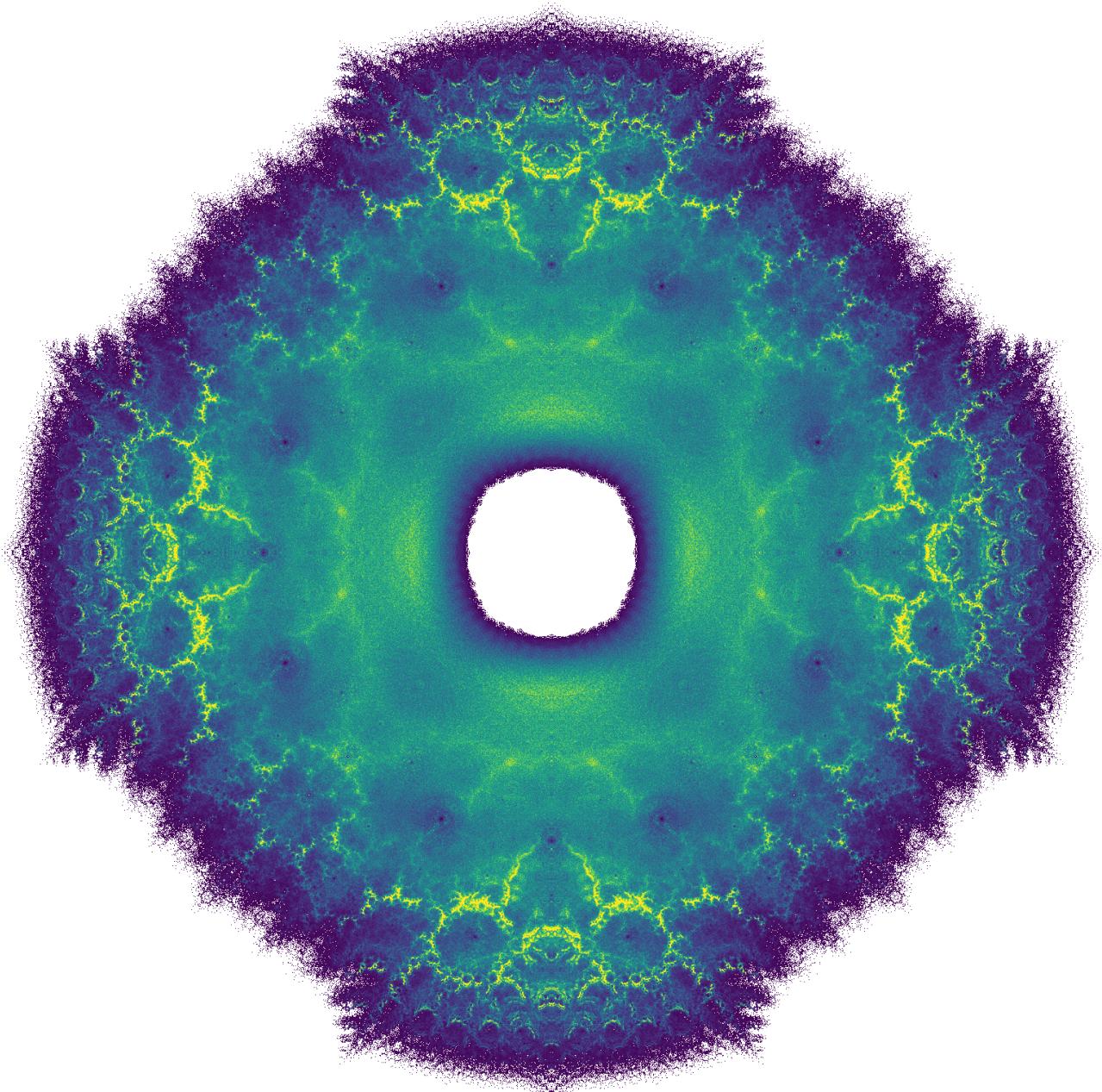


**Bohemian Matrices**  
**2021 Calendar**



Skew-symmetric tridiagonal,

$m = 10, P = (1, \alpha, \alpha^3, \bar{\alpha}, \bar{\alpha}^3, i)$  where  $\alpha = \exp(\pi i/8)$ .

Image ©(2020) Robert M. Corless and Steven E. Thornton

M	T	W	T	F	S	S
					1	2
					3	
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

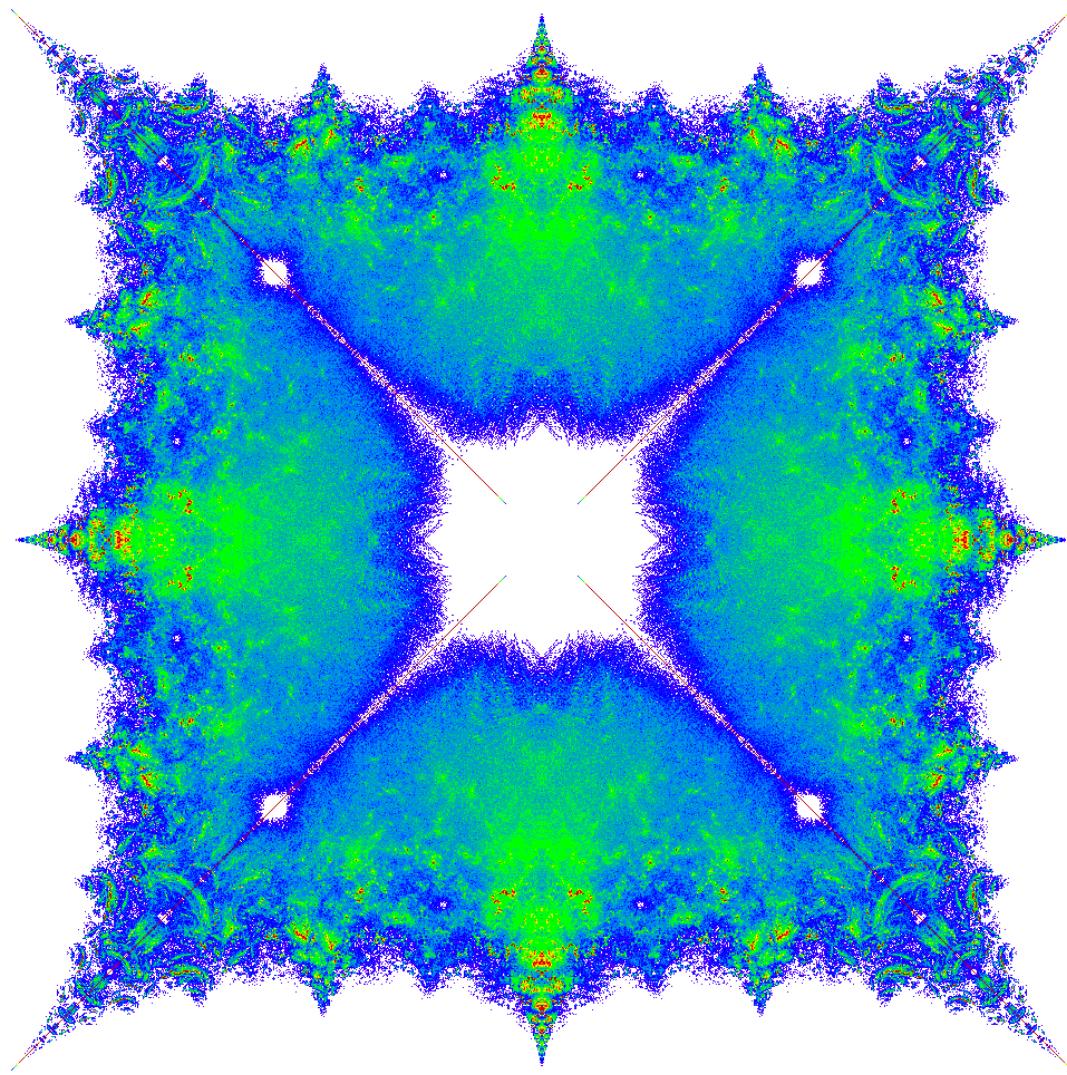
December

M	T	W	T	F	S	S
1	2	3	4	5	6	
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

February

M	T	W	T	F	S	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28

# January 2021



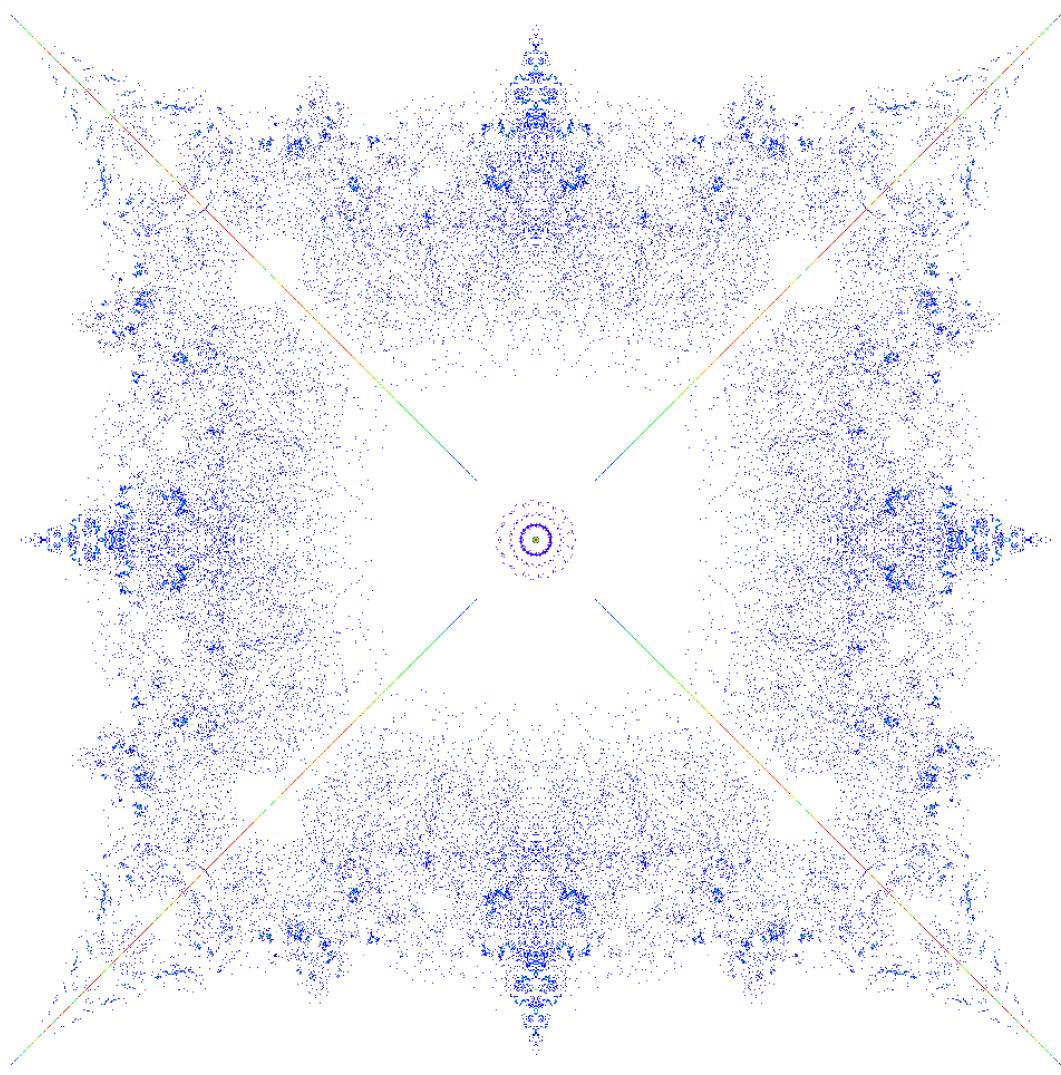
Skew-symmetric tridiagonal,  
 $m = 22, P = 1 \pm i$ .  
 Image ©(2020) Robert M. Corless

M	T	W	T	F	S	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28

January						
M	T	W	T	F	S	S
					1	2
					3	
	4	5	6	7	8	9
	11	12	13	14	15	16
	17					
	18	19	20	21	22	23
	24	25	26	27	28	29
	30	31				

March						
M	T	W	T	F	S	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

February 2021



Skew-symmetric tridiagonal with visible rounding errors

$m = 15, P = 1 \pm i$ .

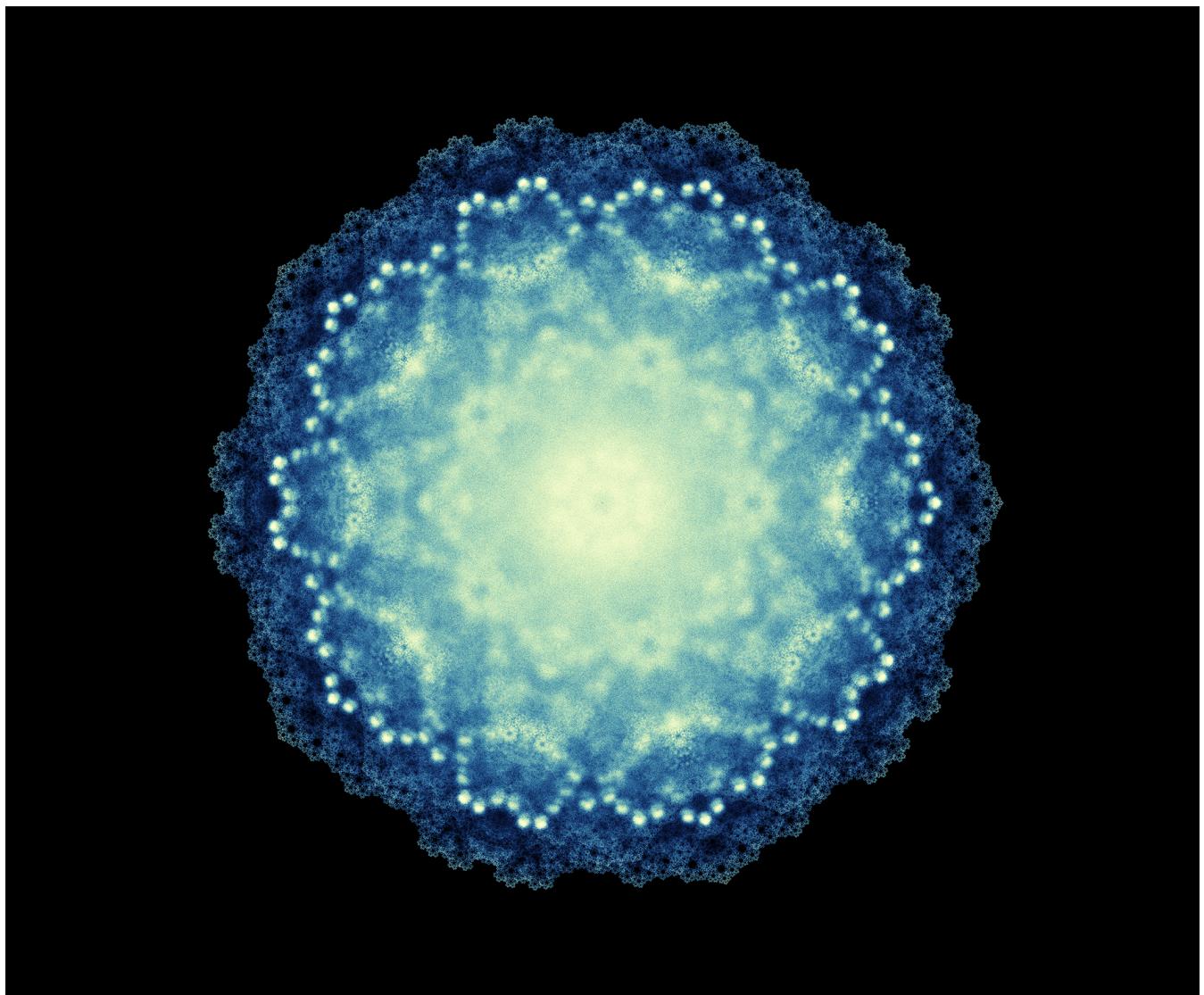
Image ©(2020) Robert M. Corless

M	T	W	T	F	S	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

February						
M	T	W	T	F	S	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28

April						
M	T	W	T	F	S	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

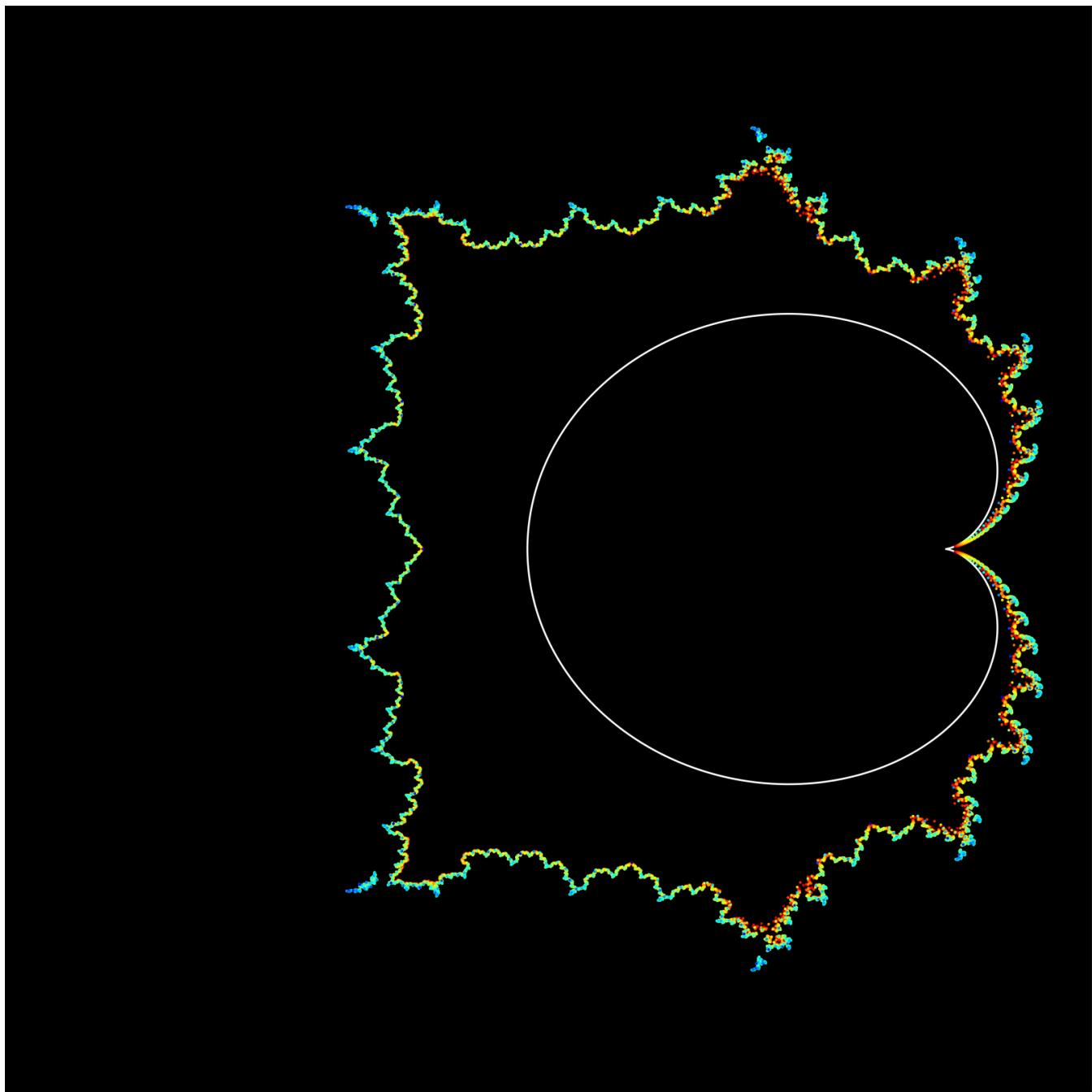
# March 2021



Upper Hessenberg Toeplitz matrices with diagonal entries fixed at 0, subdiagonal entries fixed at 1, and the population is all complex fifth roots of unity. Dimension  $m = 13$ , sample of 10 million matrices.

Image ©(2020) Robert M. Corless and Steven E. Thornton

**April  
2021**



Complex roots of the Fibonacci-Mandelbrot polynomials defined by  $q_0 = 0$ ,  $q_1 = 1$ ,  $q_{n+1} = zq_n q_{n-1} + 1$  for  $n$  from 4 through 30.  
Image ©(2015) Eunice Y. S. Chan and Robert M. Corless

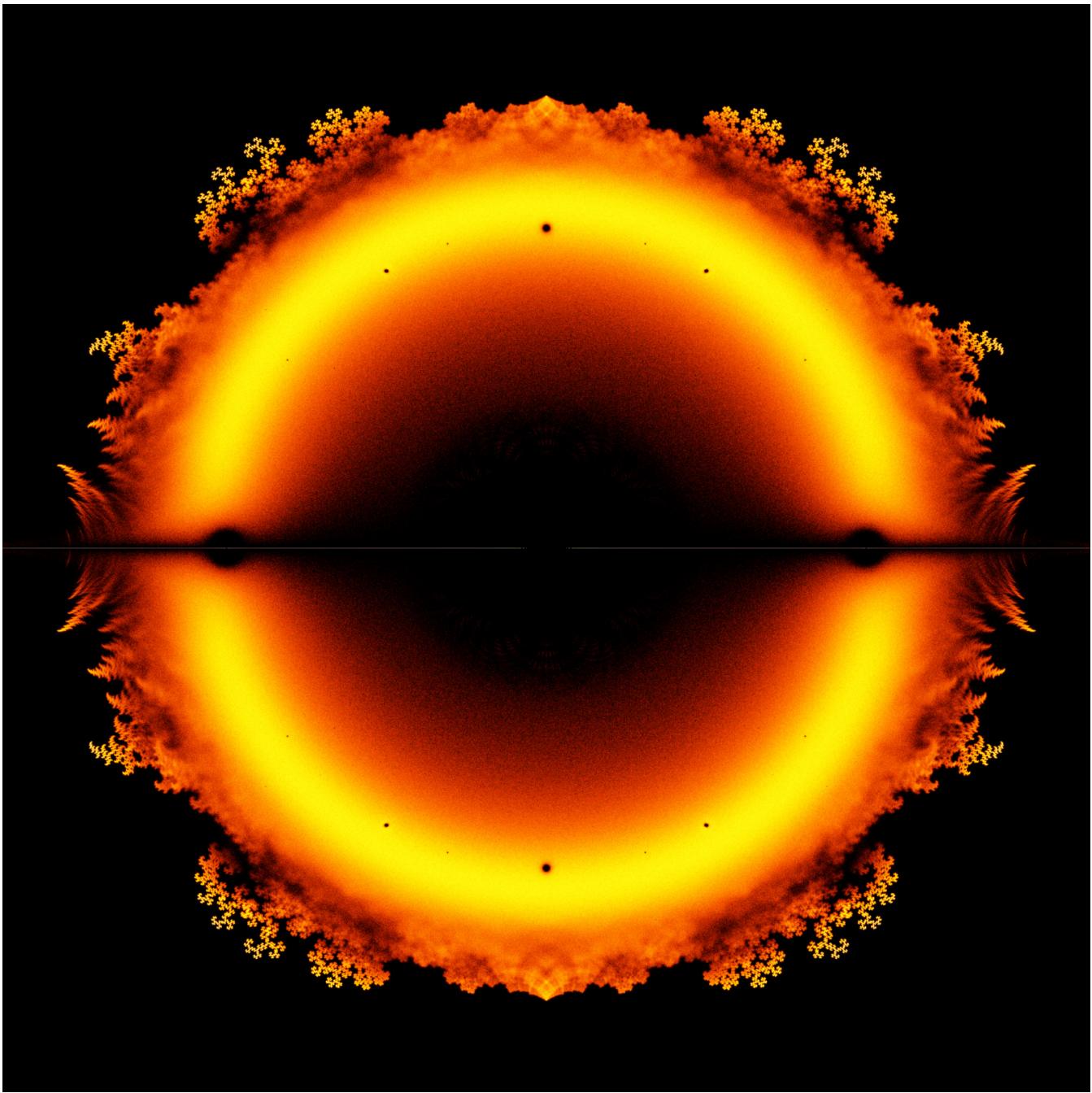
M	T	W	T	F	S	S
					1	2
<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>
<b>17</b>	<b>18</b>	<b>19</b>	<b>20</b>	<b>21</b>	<b>22</b>	<b>23</b>
<b>24</b>	<b>25</b>	<b>26</b>	<b>27</b>	<b>28</b>	<b>29</b>	<b>30</b>
<b>31</b>						

April						
M	T	W	T	F	S	S
					1	2
					5	6
					7	8
					9	10
					11	
					12	13
					14	15
					16	17
					18	
					19	20
					21	22
					23	24
					25	
					26	27
					28	29
					30	

June

June						
M	T	W	T	F	S	S
					1	2
					3	4
					5	6
					7	8
					9	10
					11	12
					13	
					14	15
					16	17
					18	19
					20	21
					22	23
					24	25
					26	27
					28	29
					30	

May 2021



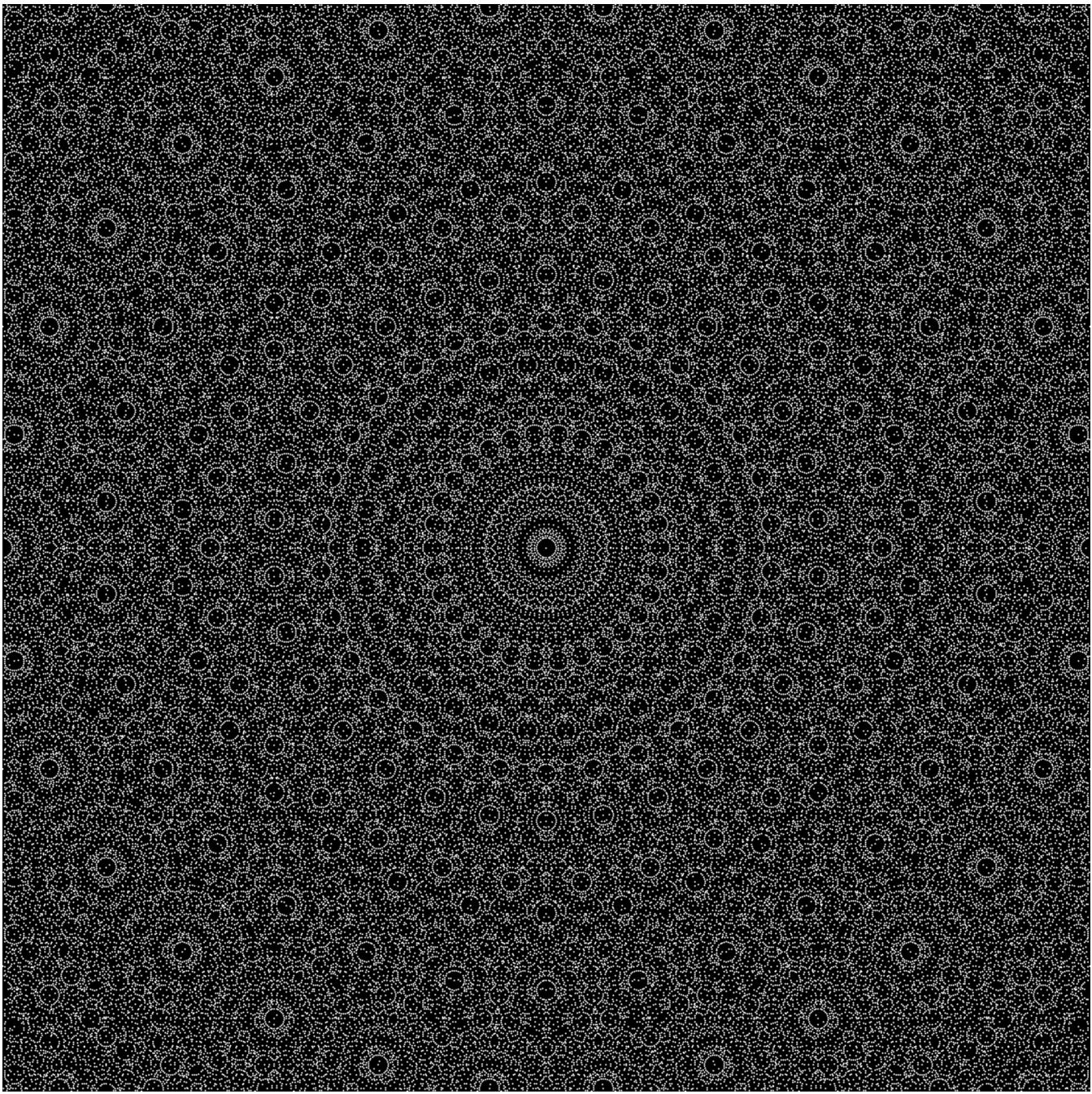
Doubly companion matrices with population  $\pm 1$ . Dimension  $m = 19$ , sample of 10 million matrices.  
Image ©(2018) Robert M. Corless and Steven E. Thornton

M	T	W	T	F	S	S
1	2	3	4	5	6	
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

May						
M	T	W	T	F	S	S
1	2					
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

July						
M	T	W	T	F	S	S
1	2	3	4			
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

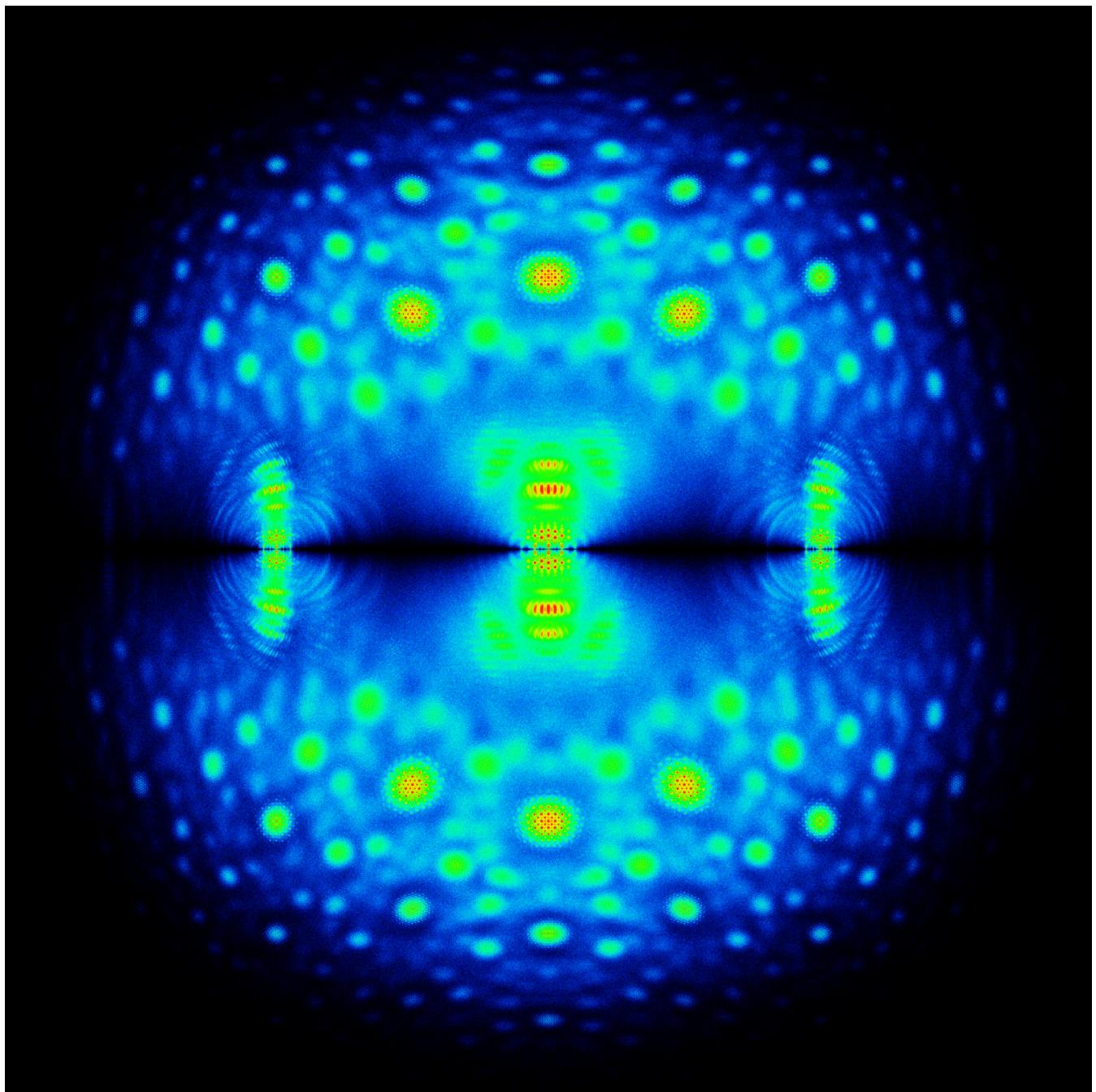
# June 2021



Circulant matrices with population  $(-1, 0, 1)$ . Dimension  $m = 15$ , sample of 5 million matrices.  
Image ©(2015) Robert M. Corless and Jonathan Briño-Tarasoff

	M	T	W	T	F	S	S	June
	1	2	3	4				
	5	6	7	8	9	10	11	
	12	13	14	15	16	17	18	
	19	20	21	22	23	24	25	
	26	27	28	29	30	31		
	1	2	3	4	5	6	7	8
	9	10	11	12	13	14	15	16
	17	18	19	20	21	22	23	24
	25	26	27	28	29	30	31	

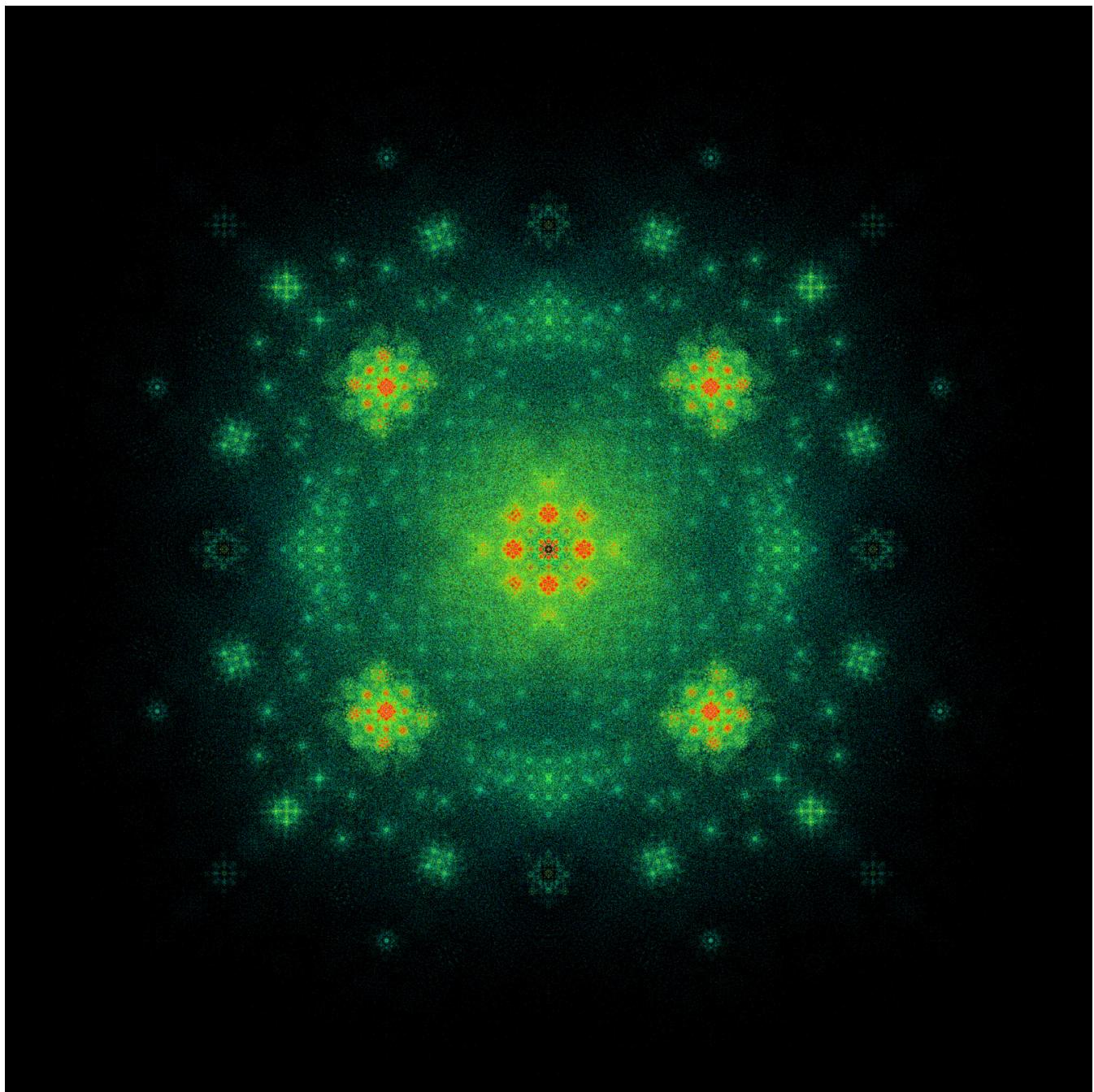
# July 2021



Unstructured matrices with population  $(-20, -1, 0, 1, 20)$ . Dimension  $m = 5$ , sample of 73 million matrices.  
Image ©(2017) Robert M. Corless and Steven E. Thornton

M	T	W	T	F	S	S	July						
							1	2	3	4	5	6	7
2	3	4	5	6	7	8	9	10	11	12	13	14	15
9	10	11	12	13	14	15	16	17	18	19	20	21	22
16	17	18	19	20	21	22	23	24	25	26	27	28	29
23	24	25	26	27	28	29	30	31					
September							M	T	W	T	F	S	S
							1	2	3	4	5	6	7
							8	9	10	11	12	13	14
							15	16	17	18	19	20	21
							22	23	24	25	26	27	28
							29	30					

# August 2021



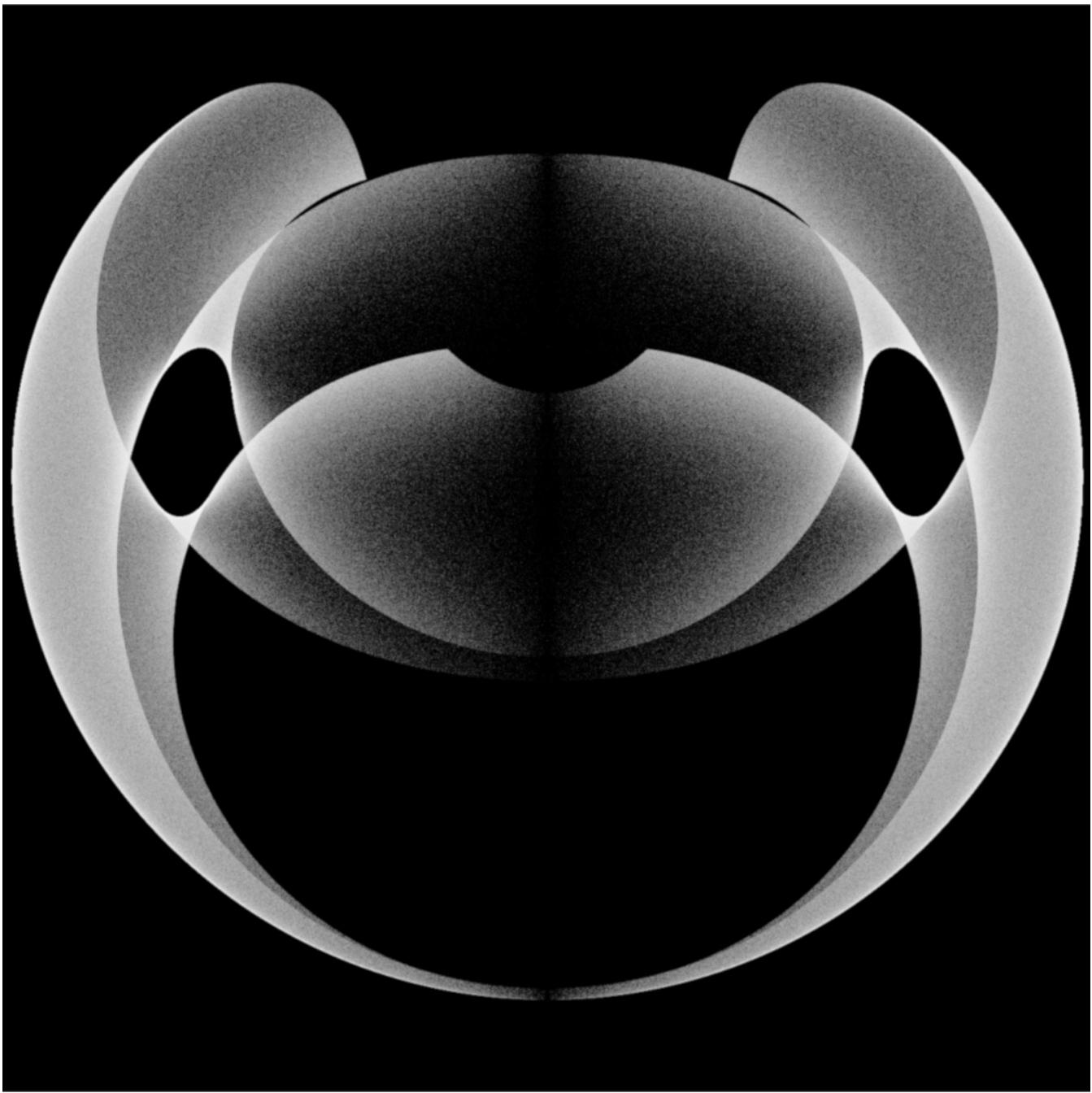
Checkerboard 6 from [www.bohemianmatrices.com](http://www.bohemianmatrices.com). Ten million 6 by 6 matrices sampled. Population has nine entries.  
Image ©(2016) Steven E. Thornton

M	T	W	T	F	S	S
			<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>
<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>	<b>17</b>	<b>18</b>	<b>19</b>
<b>20</b>	<b>21</b>	<b>22</b>	<b>23</b>	<b>24</b>	<b>25</b>	<b>26</b>
<b>27</b>	<b>28</b>	<b>29</b>	<b>30</b>			

August						
M	T	W	T	F	S	S
						1
						2 3 4 5 6 7 8
						9 10 11 12 13 14 15
						16 17 18 19 20 21 22
						23 24 25 26 27 28 29
						30 31

October						
M	T	W	T	F	S	S
						1 2 3
						4 5 6 7 8 9 10
						11 12 13 14 15 16 17
						18 19 20 21 22 23 24
						25 26 27 28 29 30 31

**September 2021**



Eigenfish 3 from [www.bohemianmatrices.com](http://www.bohemianmatrices.com), rotated 90 degrees.  
Image ©(2020) Robert M. Corless and Steven E. Thornton

M	T	W	T	F	S	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

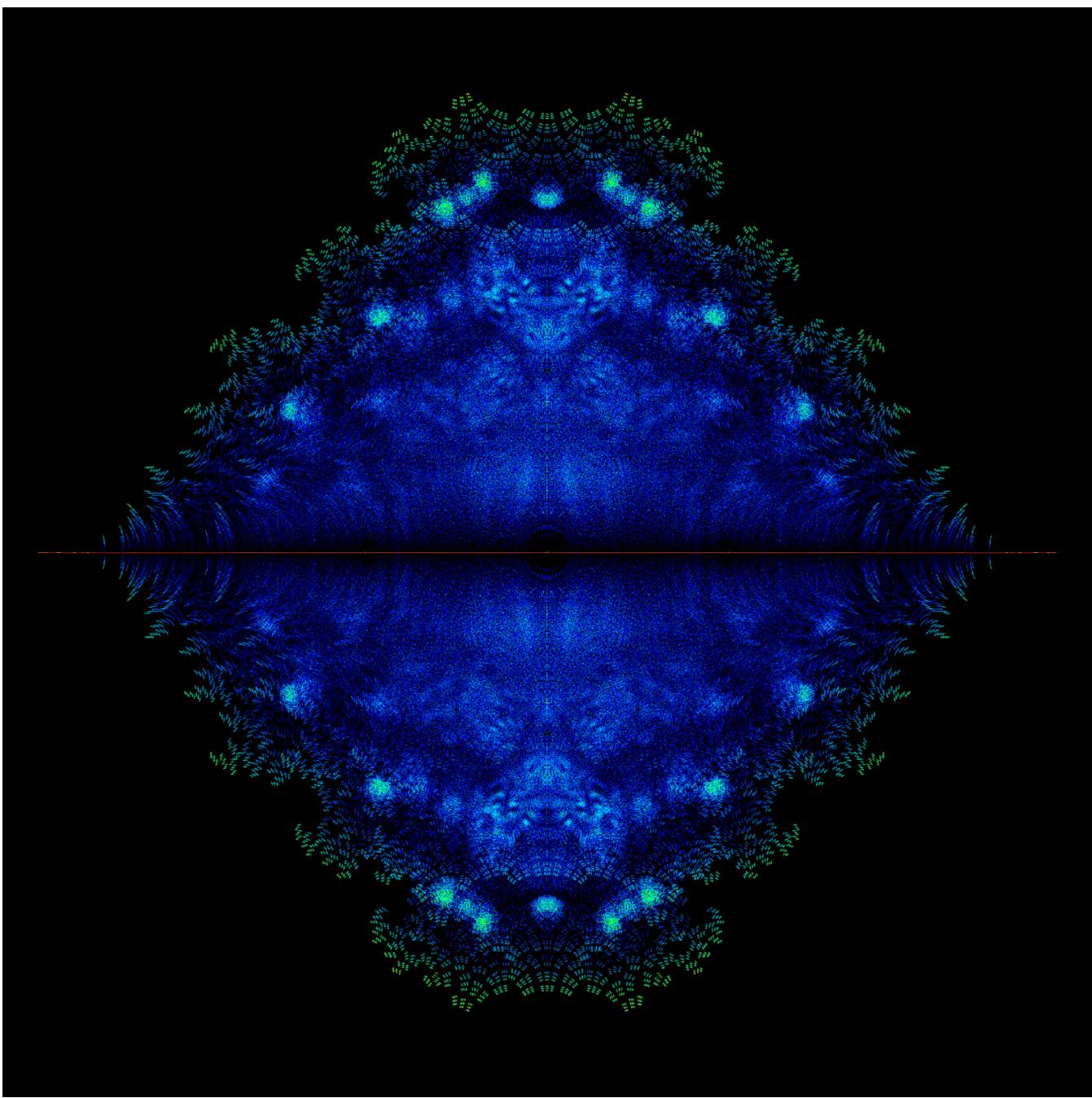
September

M	T	W	T	F	S	S
					1	2
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

November

M	T	W	T	F	S	S
					1	2
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

October 2021



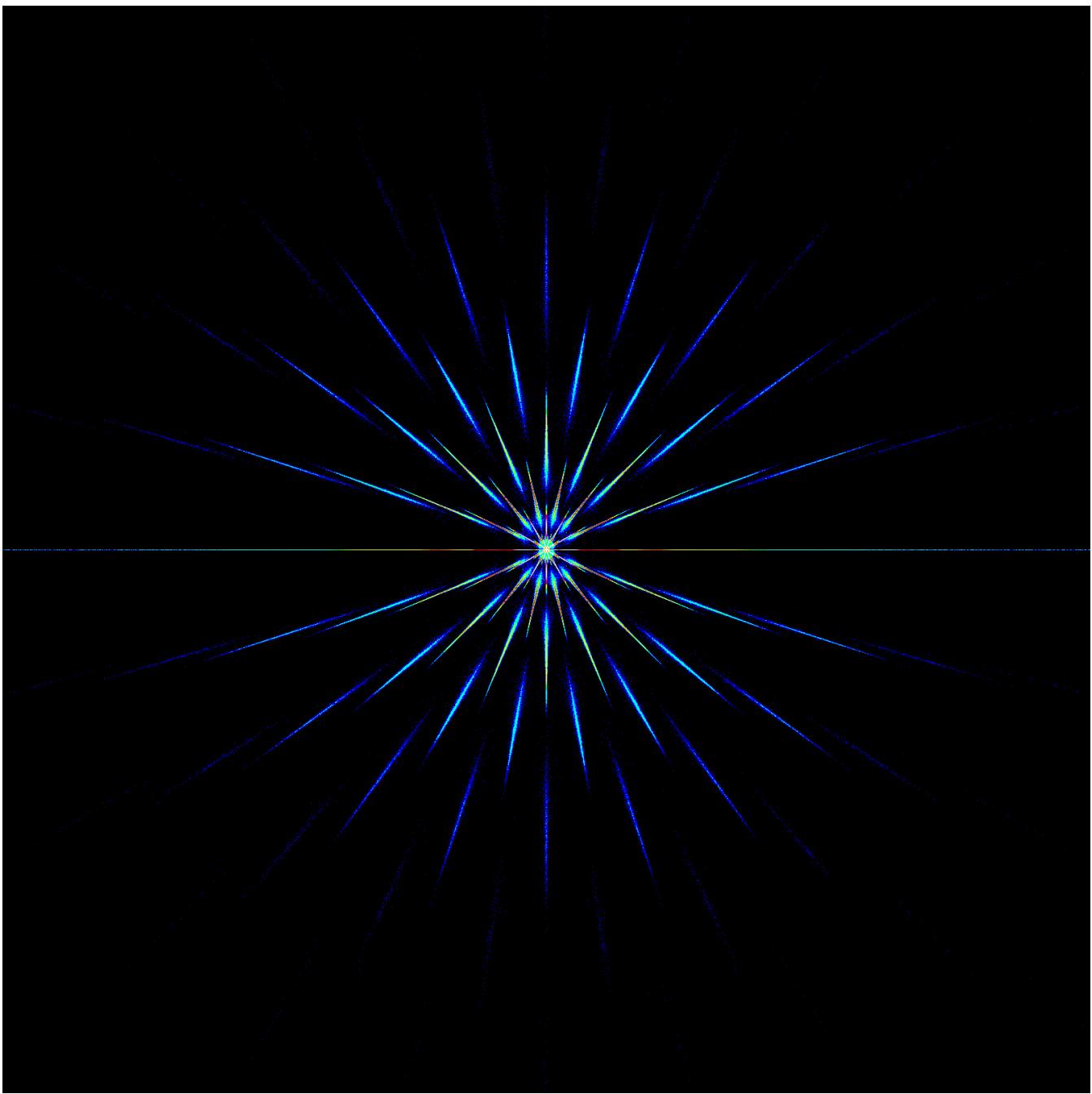
Upper Hessenberg Toeplitz matrices with diagonal entries fixed at 0, subdiagonal entries fixed at 1, and  $P = (-1, 0, 1)$ . Dimension  $m = 12$ , sample of 100 million matrices. Image ©(2018) Eunice Y. S. Chan, Robert M. Corless and Steven E. Thornton

							October
M	T	W	T	F	S	S	
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>	
<b>15</b>	<b>16</b>	<b>17</b>	<b>18</b>	<b>19</b>	<b>20</b>	<b>21</b>	
<b>22</b>	<b>23</b>	<b>24</b>	<b>25</b>	<b>26</b>	<b>27</b>	<b>28</b>	
<b>29</b>	<b>30</b>						

							December
M	T	W	T	F	S	S	
							1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

# November 2021



Anti-tridiagonal with visible rounding errors in close-up (corners at  $\pm 0.05$ ).  $m = 20$ ,  $P = (-1, 0, 1)$ , sample of 25 million matrices  
Image ©(2017) Robert M. Corless and Steven E. Thornton

M	T	W	T	F	S	S
			<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>
<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>	<b>17</b>	<b>18</b>	<b>19</b>
<b>20</b>	<b>21</b>	<b>22</b>	<b>23</b>	<b>24</b>	<b>25</b>	<b>26</b>
<b>27</b>	<b>28</b>	<b>29</b>	<b>30</b>	<b>31</b>		

November						
M	T	W	T	F	S	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

January						
M	T	W	T	F	S	S
1	2					
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

**December 2021**