

LEGO Cassiopeia A

This document contains maps for building a scientific model of the supernova remnant Cassiopeia A with Legos. The Lego model is derived from actual multiwavelength data collected by various telescopes and mimics the irregular, organic shape of the actual supernova remnant (See Fig. 1).

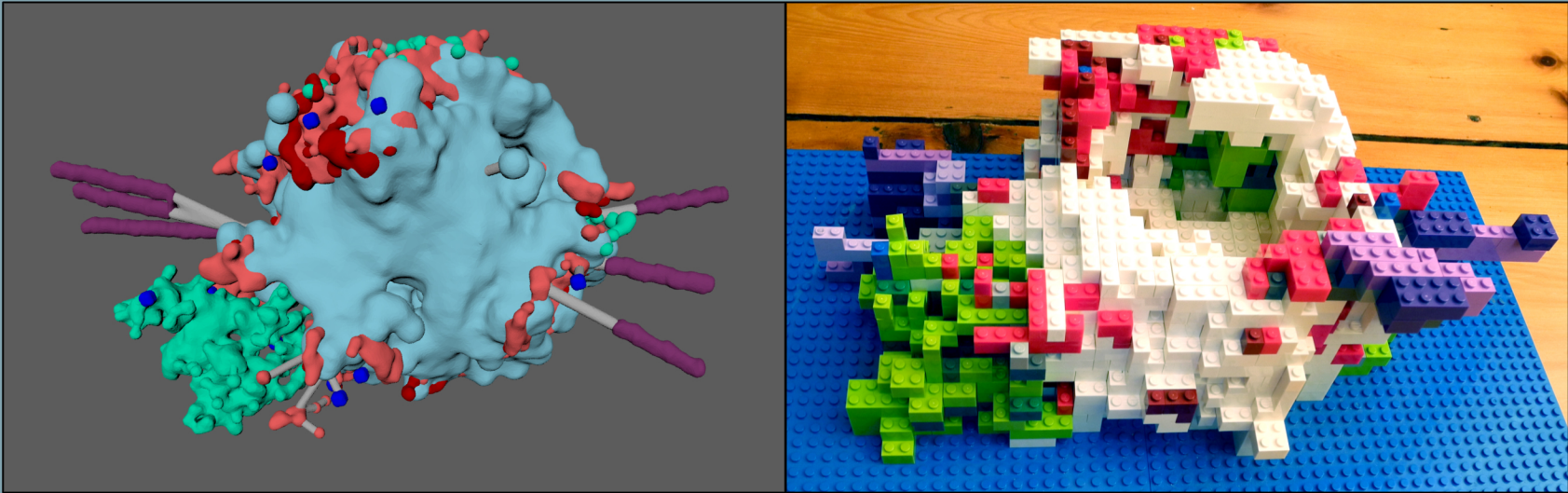


Figure 1. Digital model of Cassiopeia A (left) and Lego model of Cassiopeia A (right).

The map pages in this document contain grids for a layer-by-layer model, totaling 14 layers of Lego bricks on top of a flat platform. Start with 2 large, flat, 32x32-stud plates connected together with a 1x12 brick at the top and bottom (Could use anything from a 1x8 to a 1x16 brick - See Fig. 2) and note the grid square 33P, which corresponds to the stud in the first column on the right-most plate, 16 studs up from the bottom edge (See Fig. 3). A yellow star symbol shown on each layer at 33P is a reference point for the supernova remnant's interior neutron star and its X-Y position. The actual Z position of the neutron star is marked using a round 1x1 brick at Layer 7, 33P (See Fig. 4), and is roughly central to the model.

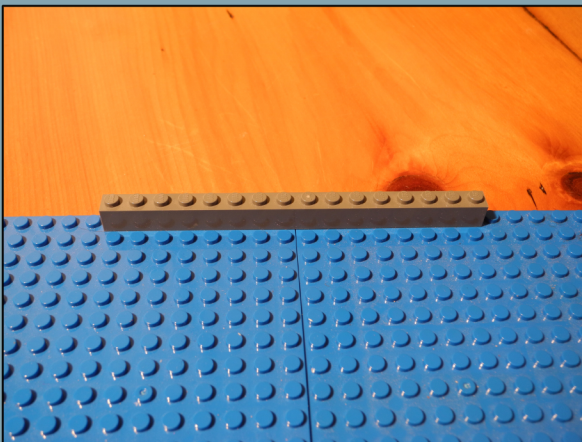


Figure 2. Connecting 2 plates.

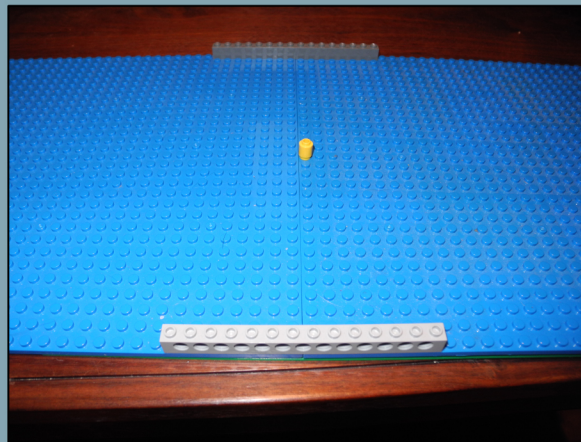


Figure 3. Marking reference point.

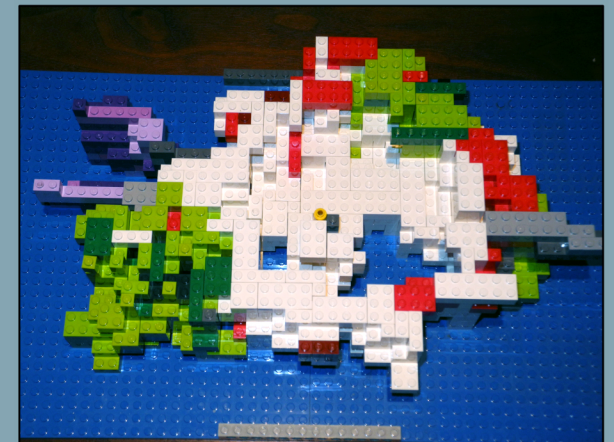










Figure 4. Neutron star position at Layer 7, 33P.

The maps include color information which corresponds to the different elements dominating each area of the supernova remnant (See Fig. 5). This color information can be ignored or modified for various reasons.

	WHITE	GREEN	RED	BROWN	BLUE	GREY	PURPLE	YELLOW
1x1	95	63	53	18	6	8	10	0
1x2	102	66	48	6	2	10	12	0
1x3	64	12	6	1	0	4	0	0
1x4	43	13	5	1	0	6	9	0
1x6	19	9	4	0	0	2	2	0
1x8	10	2	1	0	0	2*	2	0
2x2	52	33	10	1	0	10	11	0
2x3	63	17	10	0	0	5	1	0
2x4	60	37	8	0	0	4	10	0
2x6	24	4	1	0	0	1	0	0
2x8	3	2	0	0	0	0	0	0
1x1 round	0	0	0	0	0	0	0	1
32x32 plate	2**	0	0	0	0	0	0	0

-  White = Si II
-  Green = FeK
-  Red = Ar II
-  Brown = Ne II
-  Blue = S I
-  Grey = supporting structure
-  Purple = Jets from secondary explosion
-  YELLOW STAR at 33P = reference point
-  YELLOW round 1x1 = neutron star

*grey 1x8s can vary in size/color - for connecting plates
**plates can be any color

Figure 5. Lego Inventory and Color Guide.

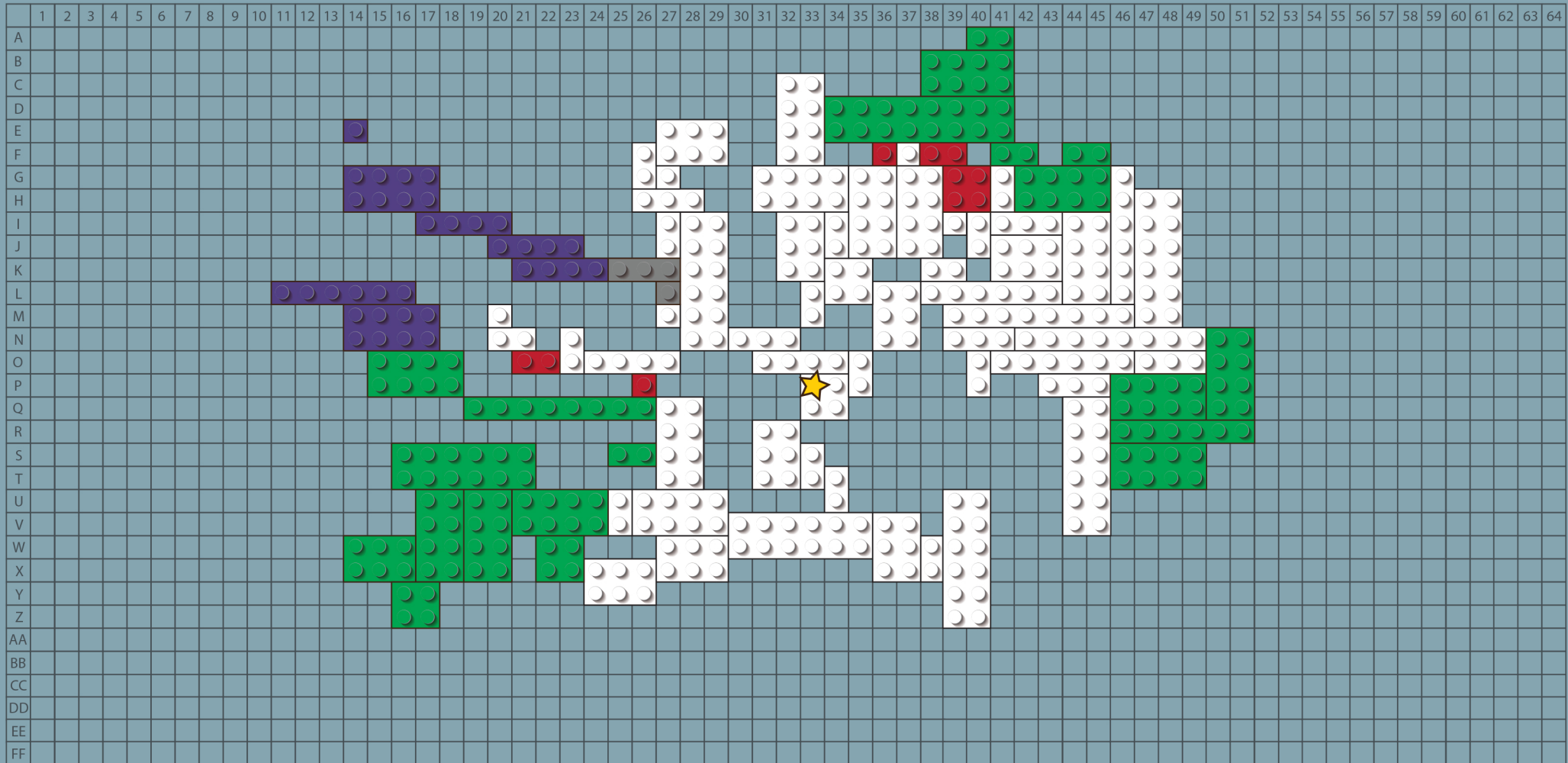
Start with Layer 1 and work your way up to Layer 14. See video at (coming soon)

Tips:

-Get a Lego Brick Separator tool.

-Start by collecting entire inventory of bricks, plus some extras in case some get lost. Each layer map lists inventory specific to that layer. Sorting necessary bricks by layer makes things easier. Each layer's inventory will fit into a 32 oz. yogurt cup or similar, so you can line up your cups in order before beginning the build.

Cassiopeia A - Layer 1

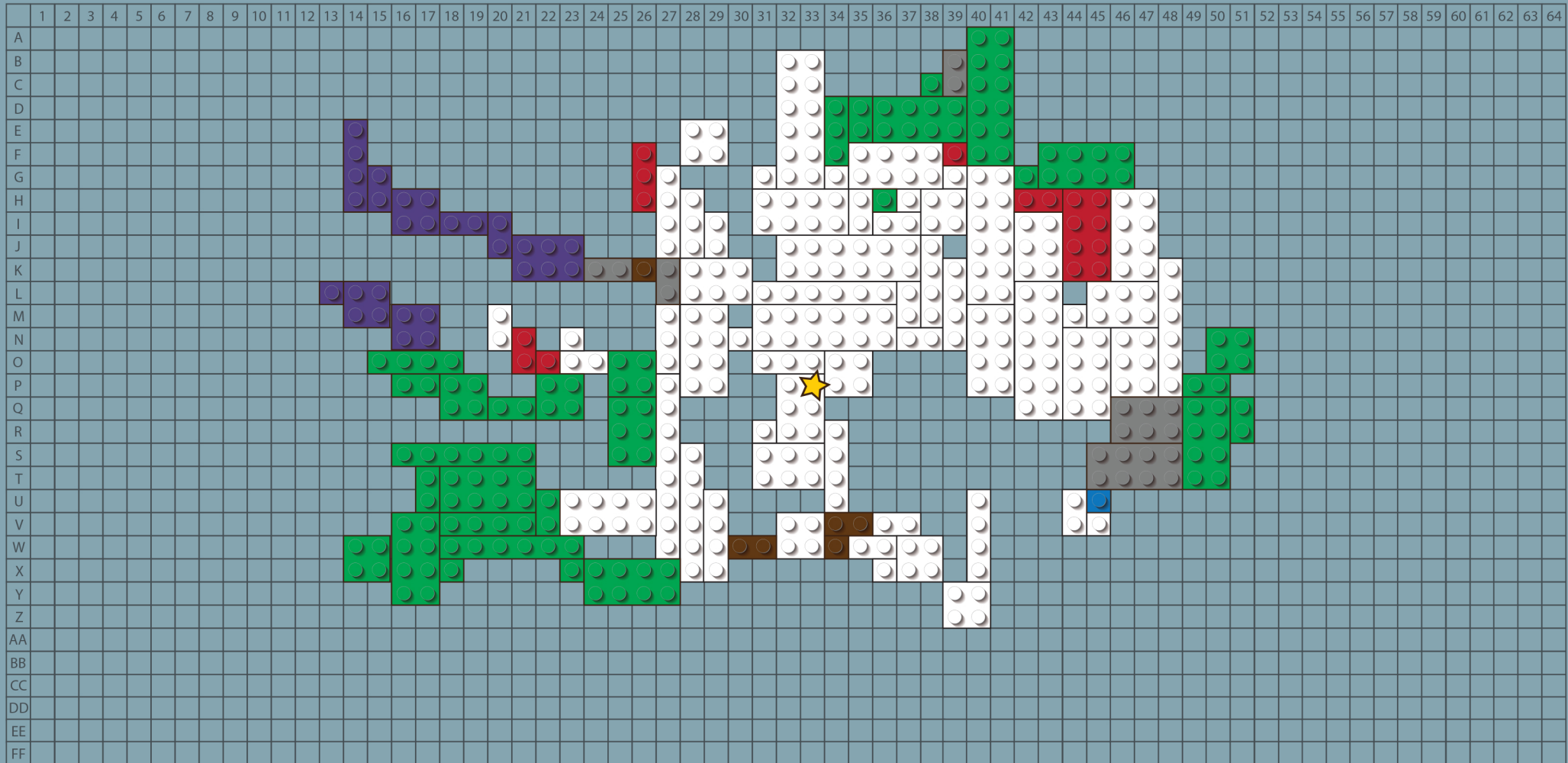


- White = Si II
- Green = FeK
- Red = Ar II
- Brown = Ne II
- Blue = S I
- Grey = supporting structure
- Purple = Jets
- YELLOW STAR at 33P = reference point
- YELLOW round 1x1 = neutron star

BRICKS NEEDED FOR THIS LAYER:

	WHITE	GREEN	RED	BROWN	BLUE	GREY	PURPLE	YELLOW
1x1	5	0	2	0	0	1	1	0
1x2	15	4	2	0	0	0	0	0
1x3	6	0	0	0	0	1	0	0
1x4	2	0	0	0	0	0	3	0
1x6	3	1	0	0	0	0	1	0
1x8	2	1	0	0	0	0	0	0
2x2	2	2	1	0	0	0	0	0
2x3	8	1	0	0	0	0	0	0
2x4	7	9	0	0	0	0	2	0
2x6	5	1	0	0	0	0	0	0
2x8	0	1	0	0	0	0	0	0
1x1 round	0	0	0	0	0	0	0	0

Cassiopeia A - Layer 2

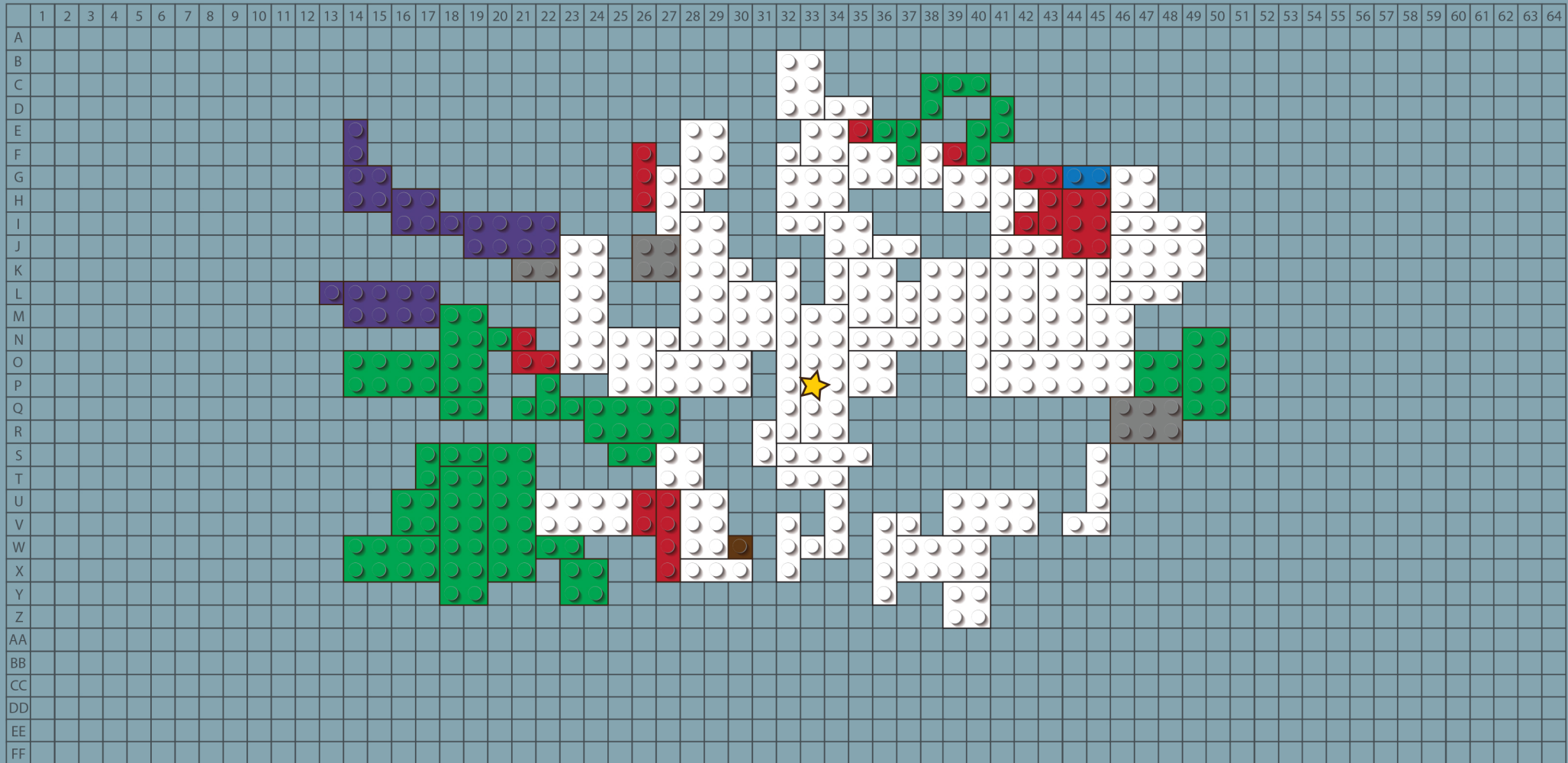


- White = Si II
- Green = FeK
- Red = Ar II
- Brown = Ne II
- Blue = S I
- Grey = supporting structure
- Purple = Jets
- YELLOW STAR at 33P = reference point
- YELLOW round 1x1 = neutron star

BRICKS NEEDED FOR THIS LAYER:

	WHITE	GREEN	RED	BROWN	BLUE	GREY	PURPLE	YELLOW
1x1	10	5	2	2	1	0	1	0
1x2	10	7	2	2	0	3	3	0
1x3	3	1	1	0	0	0	0	0
1x4	6	2	0	0	0	0	1	0
1x6	3	2	0	0	0	0	0	0
1x8	1	0	0	0	0	0	0	0
2x2	6	5	0	0	0	0	3	0
2x3	6	1	0	0	0	1	1	0
2x4	7	6	1	0	0	1	0	0
2x6	5	1	0	0	0	0	0	0
2x8	0	0	0	0	0	0	0	0
1x1 round	0	0	0	0	0	0	0	0

Cassiopeia A - Layer 3

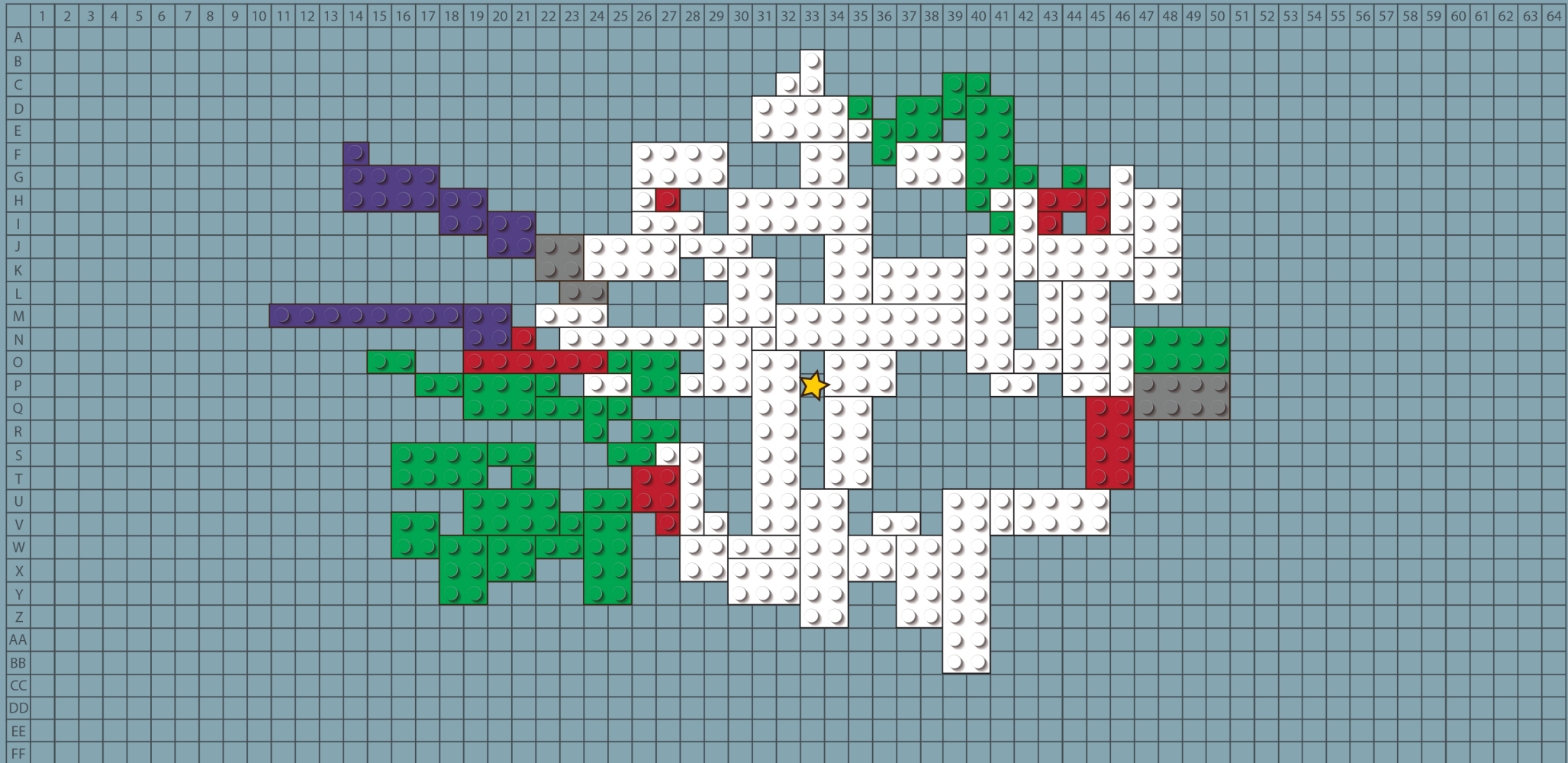


- White = Si II
- Green = FeK
- Red = Ar II
- Brown = Ne II
- Blue = S I
- Grey = supporting structure
- Purple = Jets
- YELLOW STAR at 33P = reference point
- YELLOW round 1x1 = neutron star

BRICKS NEEDED FOR THIS LAYER:

	WHITE	GREEN	RED	BROWN	BLUE	GREY	PURPLE	YELLOW
1x1	8	4	4	1	0	0	2	0
1x2	9	11	4	0	1	1	1	0
1x3	10	0	1	0	0	0	0	0
1x4	3	0	1	0	0	0	0	0
1x6	1	0	0	0	0	0	0	0
1x8	1	0	0	0	0	0	0	0
2x2	9	3	0	0	0	1	2	0
2x3	7	0	1	0	0	1	0	0
2x4	8	5	0	0	0	0	2	0
2x6	4	2	0	0	0	0	0	0
2x8	0	0	0	0	0	0	0	0
1x1 round	0	0	0	0	0	0	0	0

Cassiopeia A - Layer 4

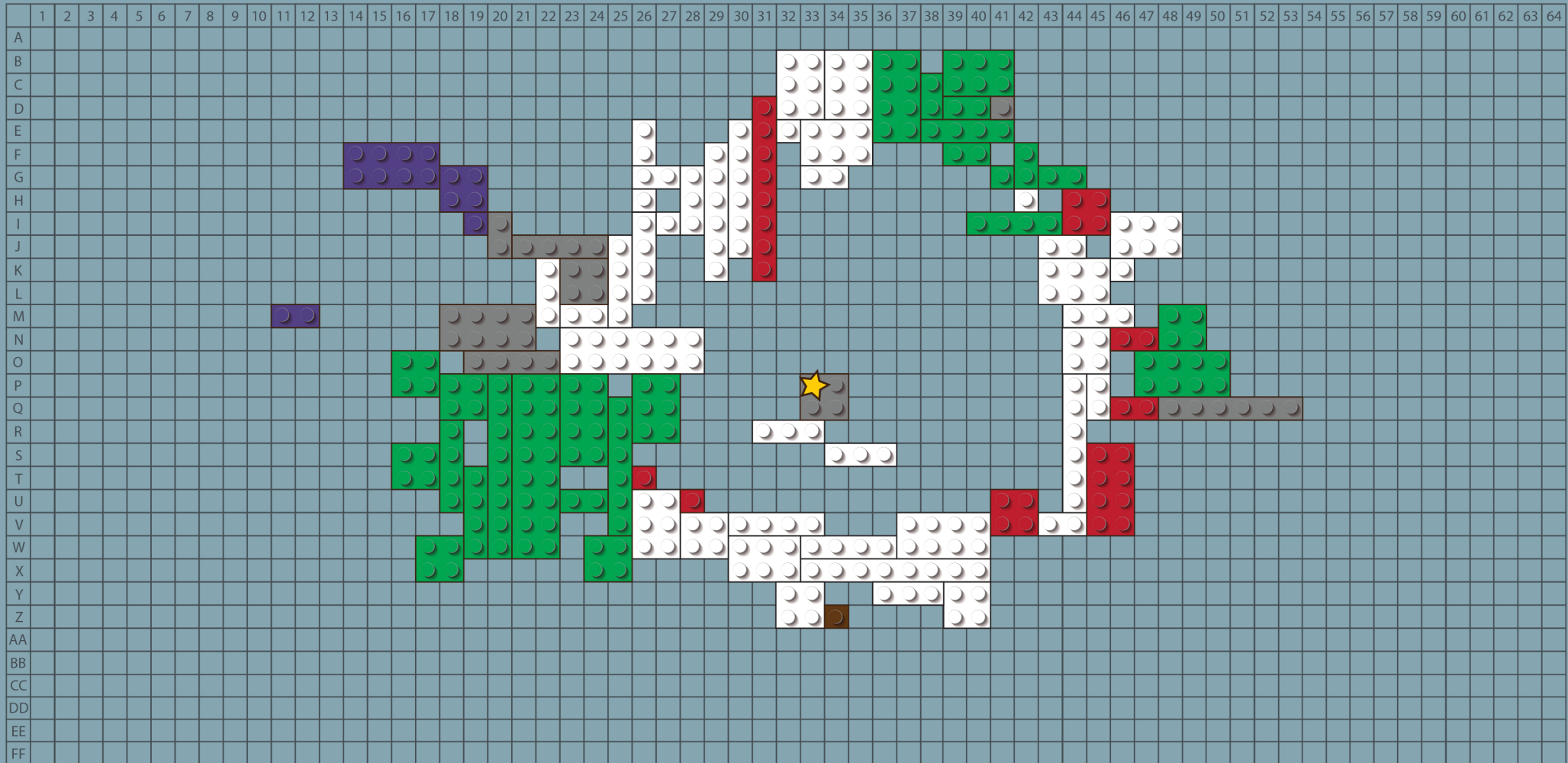


- White = Si II
- Green = FeK
- Red = Ar II
- Brown = Ne II
- Blue = S I
- Grey = supporting structure
- Purple = Jets
- YELLOW STAR at 33P = reference point
- YELLOW round 1x1 = neutron star

BRICKS NEEDED FOR THIS LAYER:

	WHITE	GREEN	RED	BROWN	BLUE	GREY	PURPLE	YELLOW
1x1	10	11	4	0	0	0	1	0
1x2	7	11	2	0	0	1	0	0
1x3	7	0	0	0	0	0	0	0
1x4	2	0	0	0	0	0	0	0
1x6	1	0	1	0	0	0	0	0
1x8	0	0	0	0	0	0	1	0
2x2	4	4	1	0	0	1	3	0
2x3	7	2	0	0	0	0	0	0
2x4	9	5	1	0	0	1	1	0
2x6	3	0	0	0	0	0	0	0
2x8	3	0	0	0	0	0	0	0
1x1 round	0	0	0	0	0	0	0	0

Cassiopeia A - Layer 5

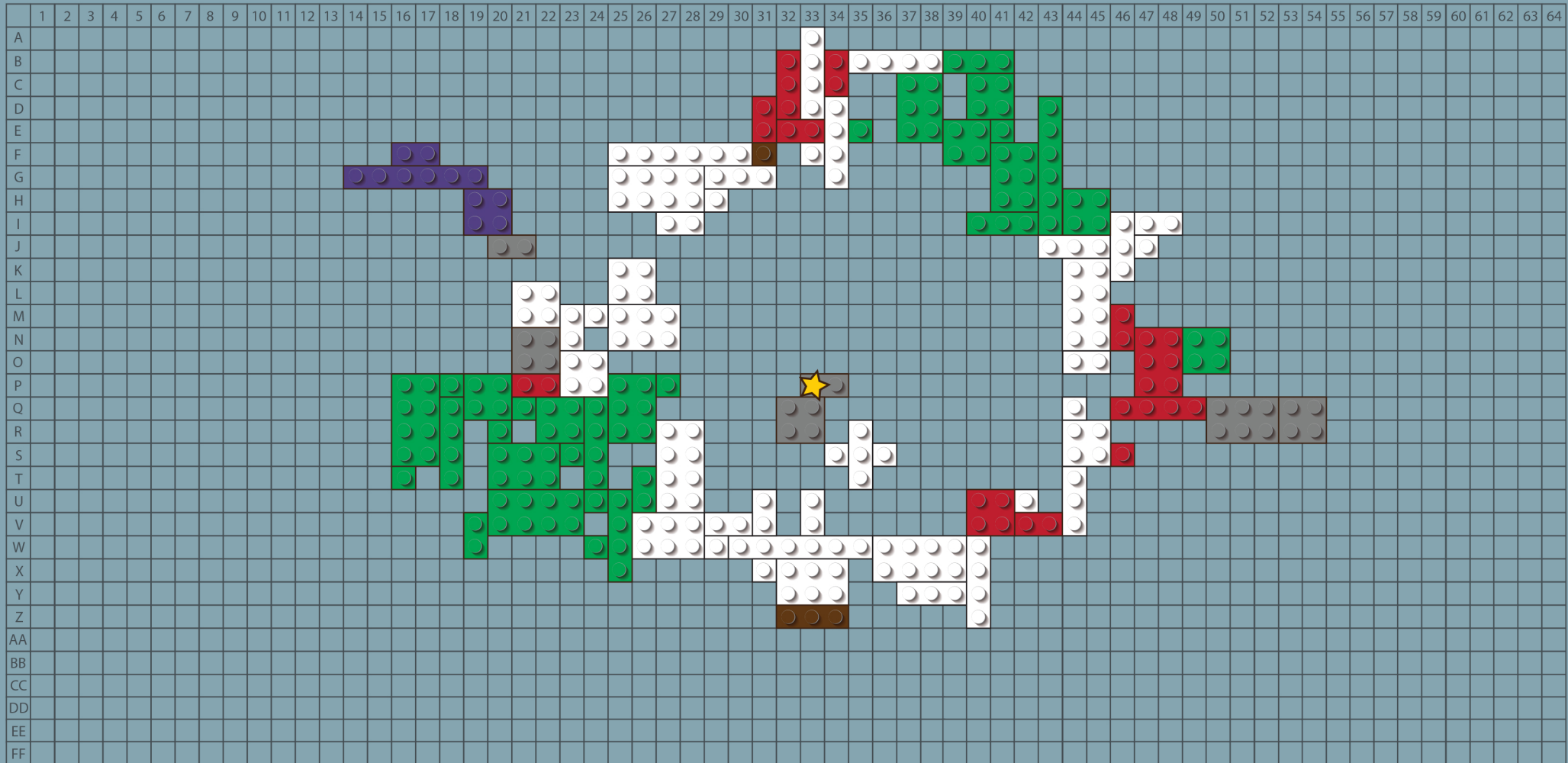


- White = Si II
- Green = FeK
- Red = Ar II
- Brown = Ne II
- Blue = S I
- Grey = supporting structure
- Purple = Jets
- YELLOW STAR at 33P = reference point
- YELLOW round 1x1 = neutron star

BRICKS NEEDED FOR THIS LAYER:

	WHITE	GREEN	RED	BROWN	BLUE	GREY	PURPLE	YELLOW
1x1	5	1	2	1	0	1	1	0
1x2	7	6	2	0	0	1	1	0
1x3	6	0	0	0	0	0	0	0
1x4	4	4	0	0	0	2	0	0
1x6	3	1	0	0	0	1	0	0
1x8	1	1	1	0	0	0	0	0
2x2	4	6	2	0	0	2	1	0
2x3	7	2	0	0	0	0	0	0
2x4	1	3	1	0	0	1	1	0
2x6	1	0	0	0	0	0	0	0
2x8	0	1	0	0	0	0	0	0
1x1 round	0	0	0	0	0	0	0	0

Cassiopeia A - Layer 6

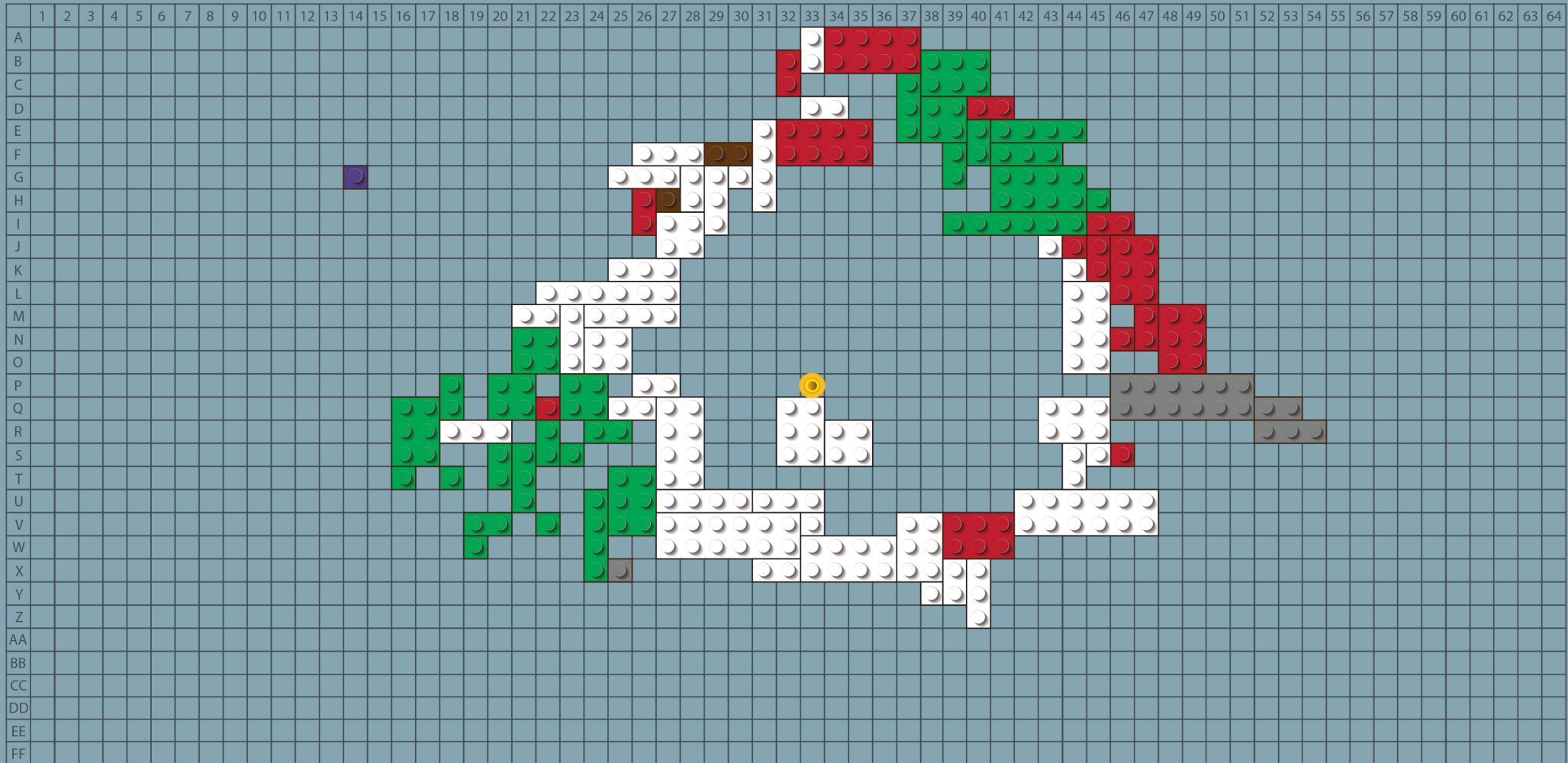


- White = Si II
- Green = FeK
- Red = Ar II
- Brown = Ne II
- Blue = S I
- Grey = supporting structure
- Purple = Jets
- YELLOW STAR at 33P = reference point
- YELLOW round 1x1 = neutron star

BRICKS NEEDED FOR THIS LAYER:

	WHITE	GREEN	RED	BROWN	BLUE	GREY	PURPLE	YELLOW
1x1	10	10	1	1	0	0	0	0
1x2	7	2	6	0	0	2	1	0
1x3	6	2	1	1	0	0	0	0
1x4	4	3	1	0	0	0	0	0
1x6	2	1	0	0	0	0	1	0
1x8	0	0	0	0	0	0	0	0
2x2	4	6	1	0	0	3	1	0
2x3	3	4	1	0	0	1	0	0
2x4	4	2	0	0	0	0	0	0
2x6	0	0	0	0	0	0	0	0
2x8	0	0	0	0	0	0	0	0
1x1 round	0	0	0	0	0	0	0	0

Cassiopeia A - Layer 7

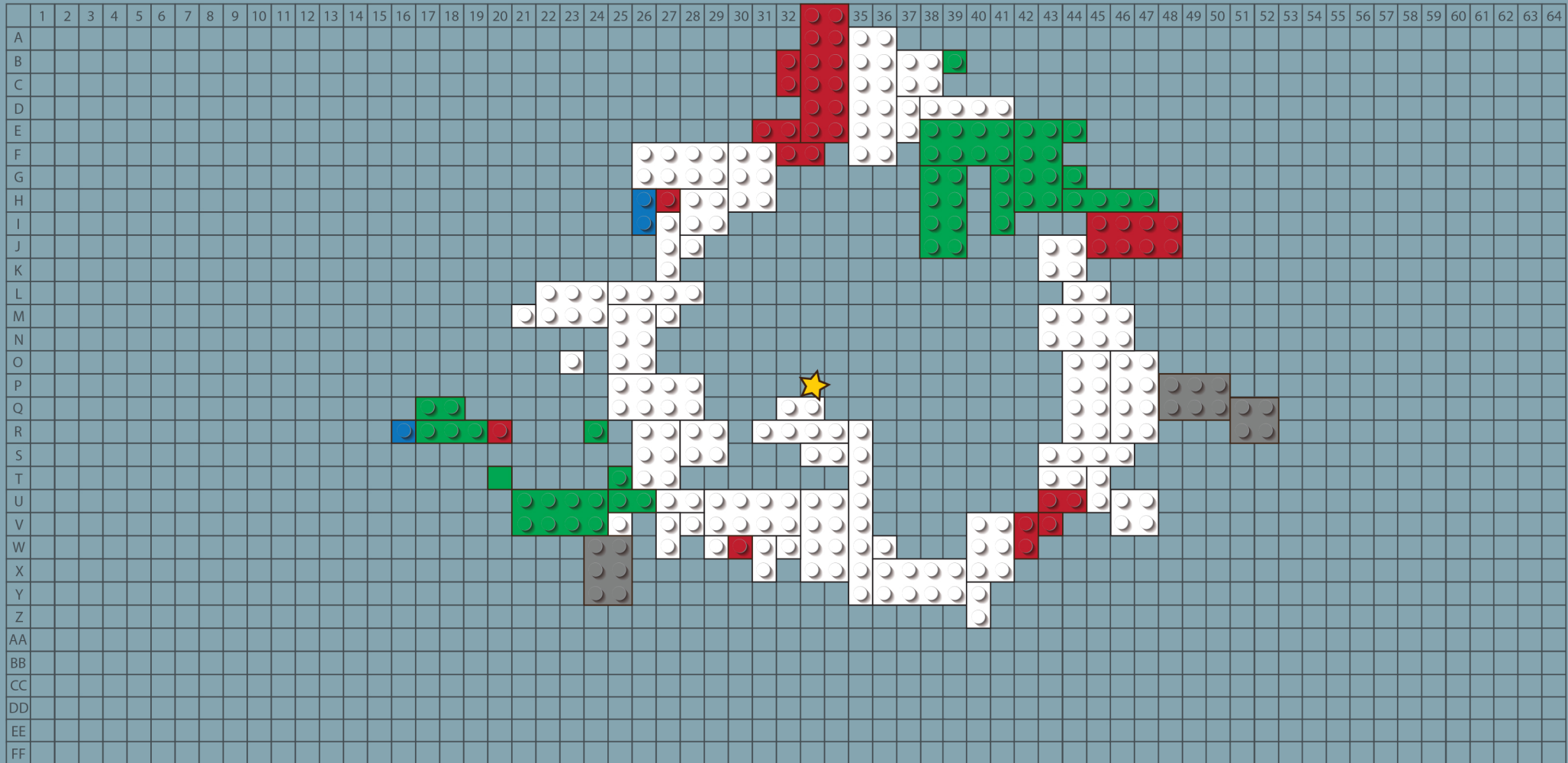


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- Grey = supporting structure
- Purple = Jets
- YELLOW STAR at 33P = reference point
- YELLOW round 1x1 = neutron star

BRICKS NEEDED FOR THIS LAYER:

	WHITE	GREEN	RED	BROWN	BLUE	GREY	PURPLE	YELLOW
1x1	6	6	4	1	0	1	1	0
1x2	9	7	6	1	0	1	0	0
1x3	8	3	0	0	0	1	0	0
1x4	3	2	0	0	0	0	0	0
1x6	1	1	0	0	0	0	0	0
1x8	0	0	0	0	0	0	0	0
2x2	3	4	0	0	0	0	0	0
2x3	3	3	3	0	0	0	0	0
2x4	3	1	2	0	0	0	0	0
2x6	2	0	0	0	0	1	0	0
2x8	0	0	0	0	0	0	0	0
1x1 round	0	0	0	0	0	0	0	****1

Cassiopeia A - Layer 8

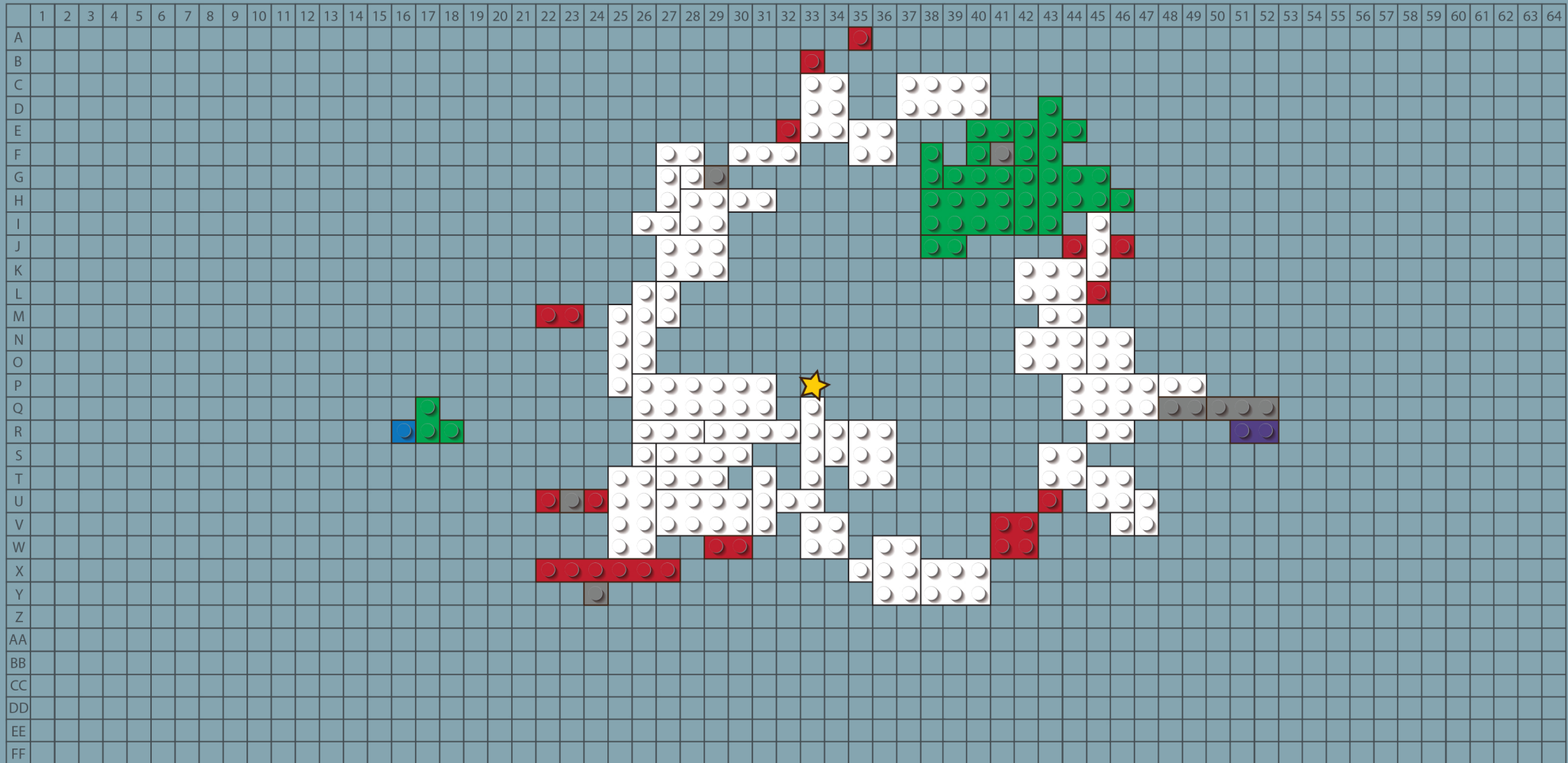


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- Green = FeK
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- Brown = Ne II
- Blue = S I
- Grey = supporting structure
- Purple = Jets
- YELLOW STAR at 33P = reference point
- YELLOW round 1x1 = neutron star

BRICKS NEEDED FOR THIS LAYER:

	WHITE	GREEN	RED	BROWN	BLUE	GREY	PURPLE	YELLOW
1x1	9	6	4	0	1	0	0	0
1x2	9	2	5	0	1	0	0	0
1x3	1	2	0	0	0	0	0	0
1x4	4	1	0	0	0	0	0	0
1x6	0	0	0	0	0	0	0	0
1x8	1	0	0	0	0	0	0	0
2x2	5	0	0	0	0	1	0	0
2x3	5	0	0	0	0	2	0	0
2x4	8	4	1	0	0	0	0	0
2x6	1	0	1	0	0	0	0	0
2x8	0	0	0	0	0	0	0	0
1x1 round	0	0	0	0	0	0	0	0

Cassiopeia A - Layer 9

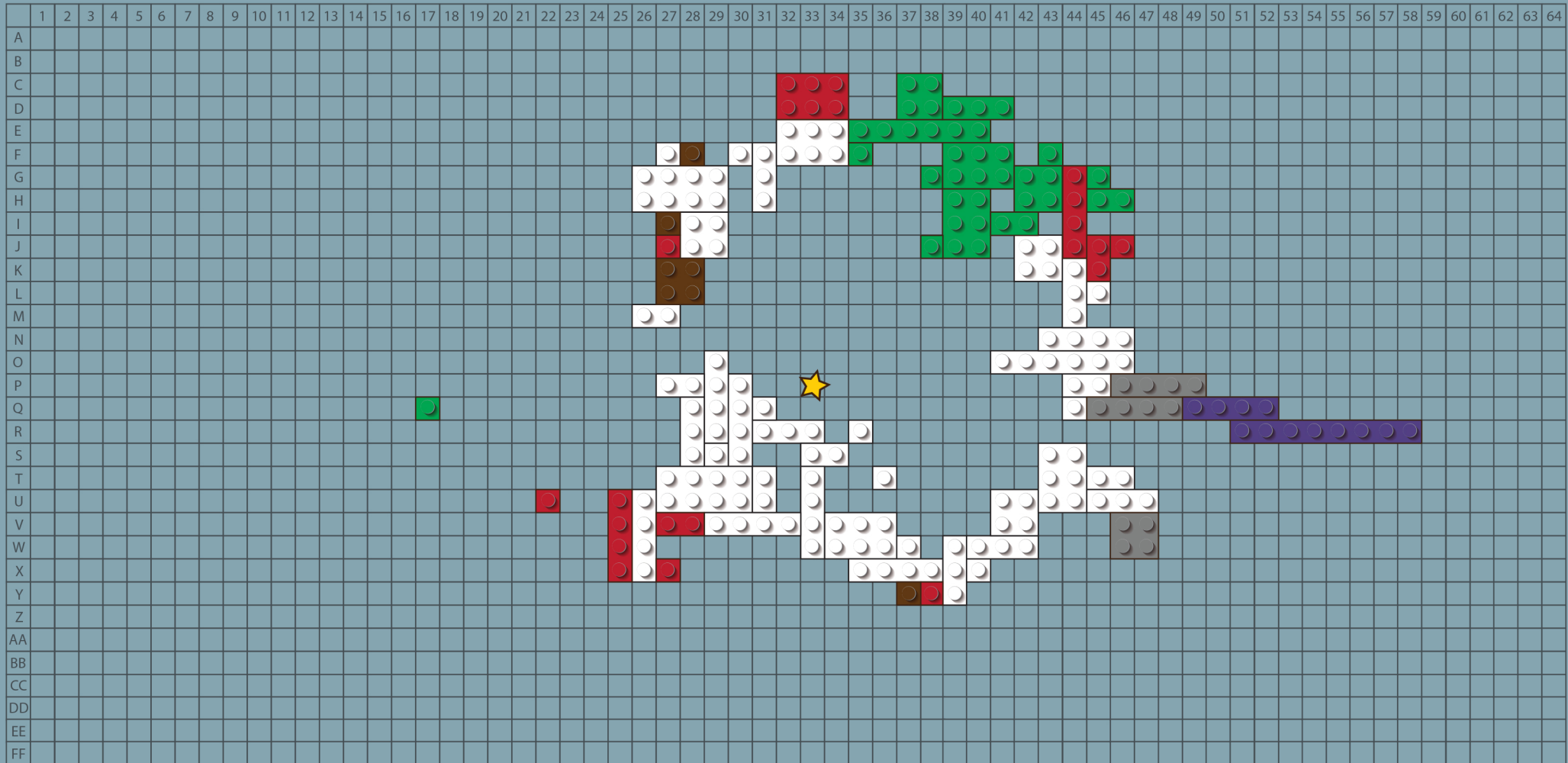


- White = Si II
- Green = FeK
- Red = Ar II
- Brown = Ne II
- Blue = S I
- Grey = supporting structure
- Purple = Jets
- YELLOW STAR at 33P = reference point
- YELLOW round 1x1 = neutron star

BRICKS NEEDED FOR THIS LAYER:

	WHITE	GREEN	RED	BROWN	BLUE	GREY	PURPLE	YELLOW
1x1	4	4	9	0	1	4	0	0
1x2	11	5	2	0	0	1	1	0
1x3	5	2	0	0	0	1	0	0
1x4	5	0	0	0	0	0	0	0
1x6	0	1	1	0	0	0	0	0
1x8	0	0	0	0	0	0	0	0
2x2	6	1	1	0	0	0	0	0
2x3	7	0	0	0	0	0	0	0
2x4	4	1	0	0	0	0	0	0
2x6	1	0	0	0	0	0	0	0
2x8	0	0	0	0	0	0	0	0
1x1 round	0	0	0	0	0	0	0	0

Cassiopeia A - Layer 10

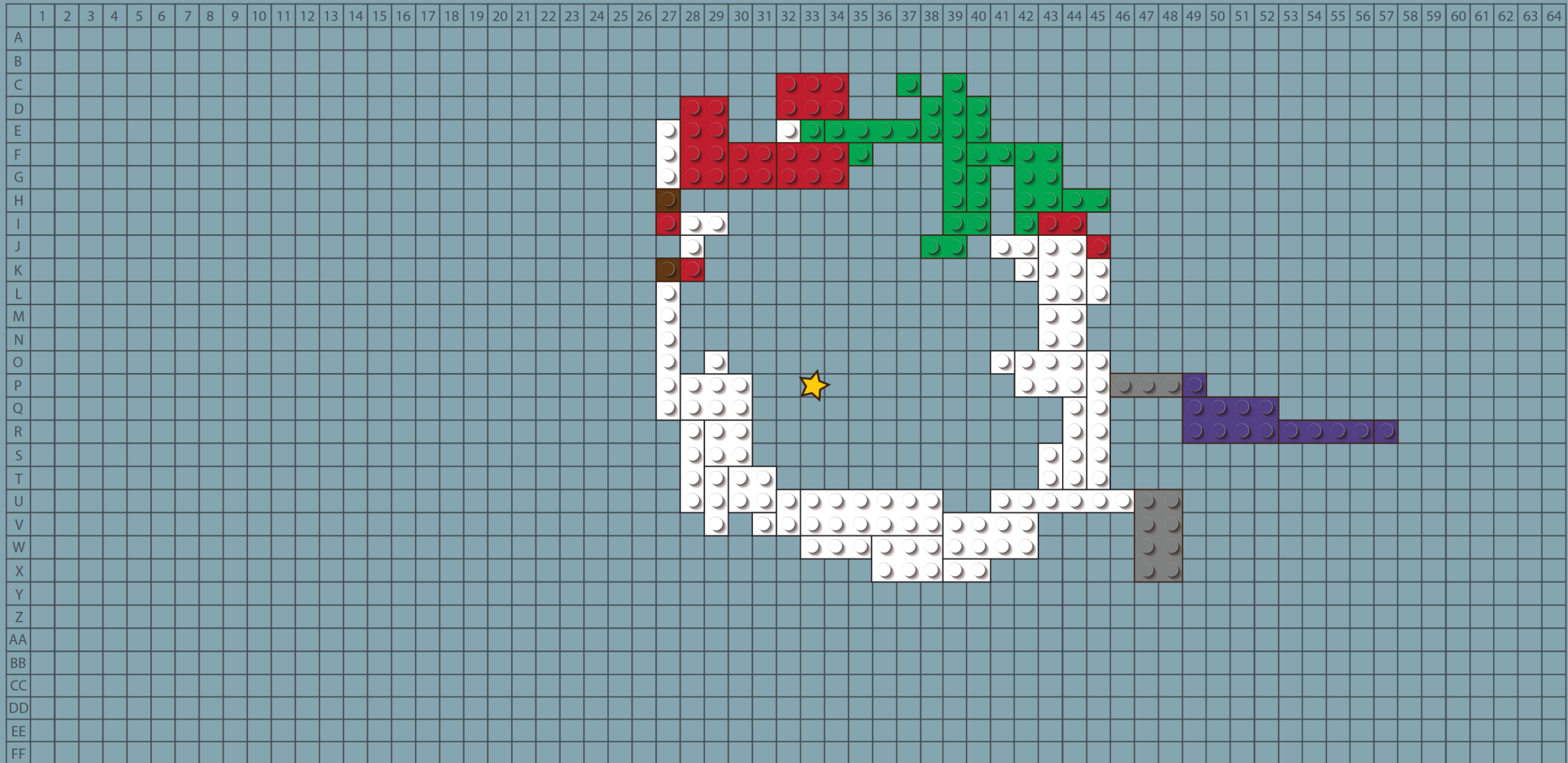


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- Green = FeK
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- Brown = Ne II
- Blue = S I
- Grey = supporting structure
- Purple = Jets
- YELLOW STAR at 33P = reference point
- YELLOW round 1x1 = neutron star

BRICKS NEEDED FOR THIS LAYER:

	WHITE	GREEN	RED	BROWN	BLUE	GREY	PURPLE	YELLOW
1x1	10	6	5	3	0	0	0	0
1x2	6	2	2	0	0	0	0	0
1x3	7	1	0	0	0	0	0	0
1x4	7	0	2	0	0	2	1	0
1x6	1	1	0	0	0	0	0	0
1x8	0	0	0	0	0	0	1	0
2x2	3	2	0	1	0	1	0	0
2x3	3	2	1	0	0	0	0	0
2x4	2	0	0	0	0	0	0	0
2x6	0	0	0	0	0	0	0	0
2x8	0	0	0	0	0	0	0	0
1x1 round	0	0	0	0	0	0	0	0

Cassiopeia A - Layer 11

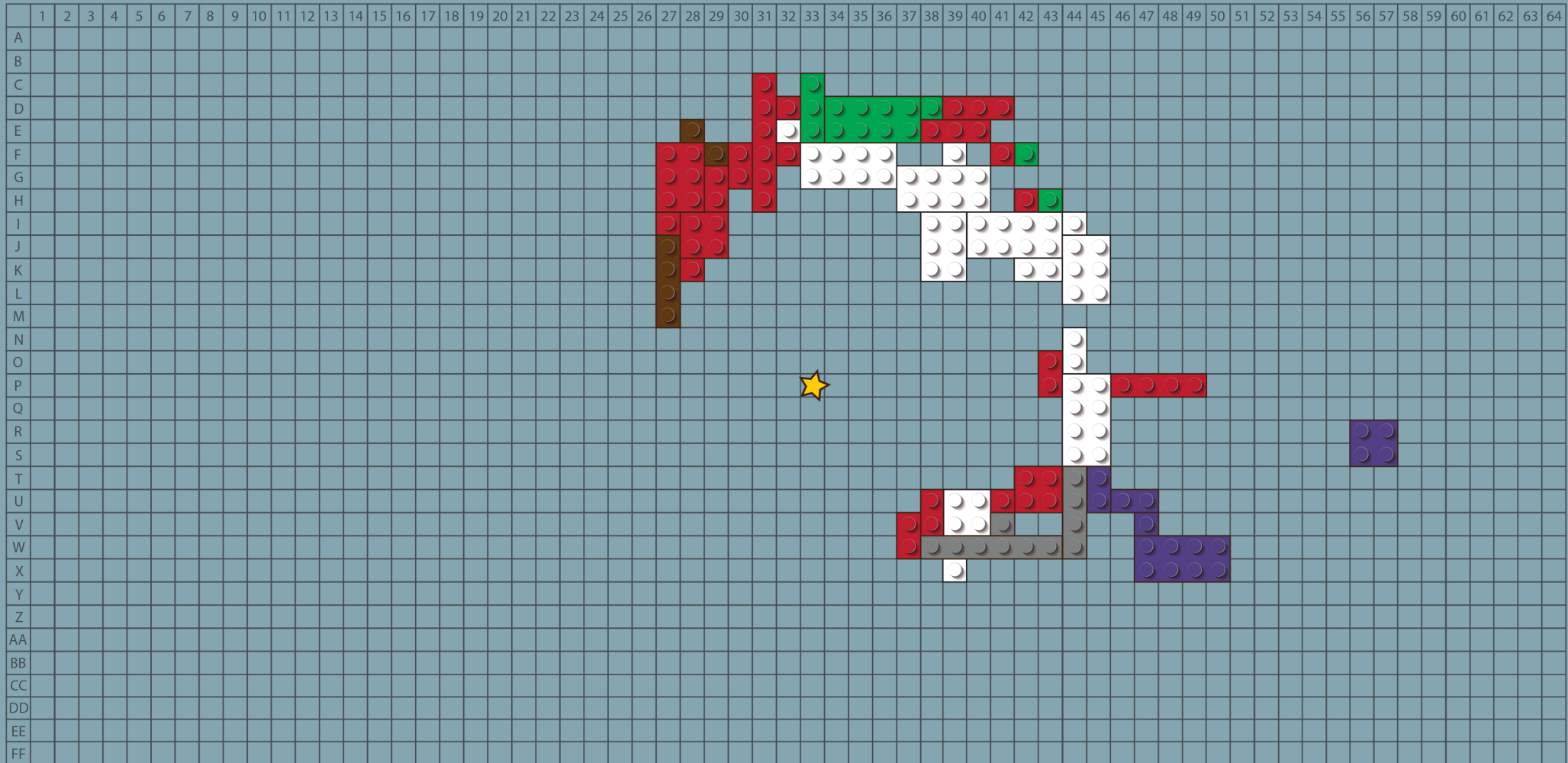


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- Green = FeK
- Red = Ar II
- Brown = Ne II
- Blue = S I
- Grey = supporting structure
- Purple = Jets
- YELLOW STAR at 33P = reference point
- YELLOW round 1x1 = neutron star

BRICKS NEEDED FOR THIS LAYER:

	WHITE	GREEN	RED	BROWN	BLUE	GREY	PURPLE	YELLOW
1x1	6	4	3	2	0	0	2	0
1x2	6	7	1	0	0	0	0	0
1x3	3	0	0	0	0	1	0	0
1x4	2	1	0	0	0	0	1	0
1x6	3	1	0	0	0	0	0	0
1x8	0	0	0	0	0	0	0	0
2x2	3	0	1	0	0	0	0	0
2x3	4	1	2	0	0	0	0	0
2x4	1	0	1	0	0	1	1	0
2x6	1	0	0	0	0	0	0	0
2x8	0	0	0	0	0	0	0	0
1x1 round	0	0	0	0	0	0	0	0

Cassiopeia A - Layer 12

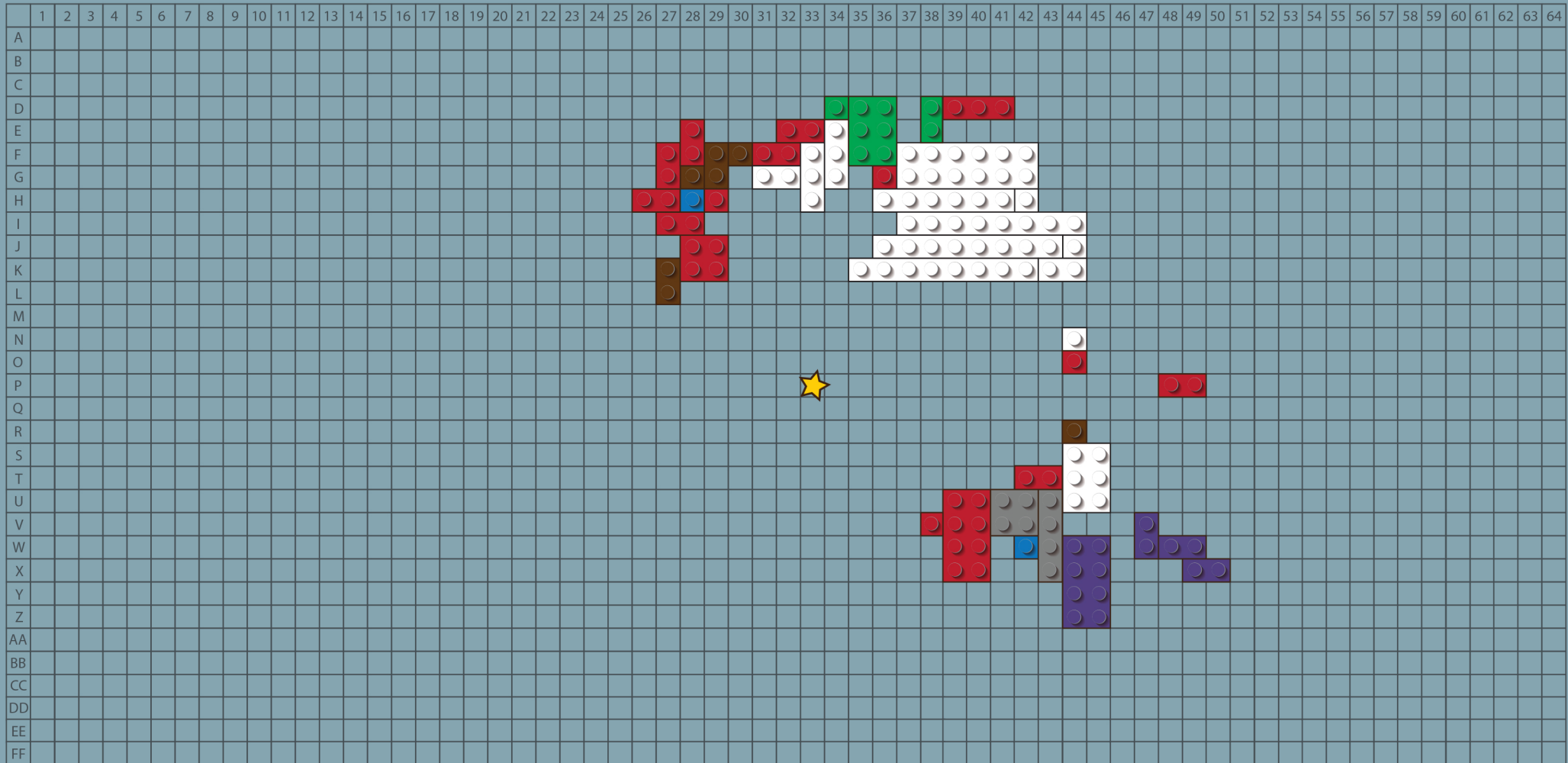


- White = Si II
- Green = FeK
- Red = Ar II
- Brown = Ne II
- Blue = S I
- Grey = supporting structure
- Purple = Jets
- YELLOW STAR at 33P = reference point
- YELLOW round 1x1 = neutron star

BRICKS NEEDED FOR THIS LAYER:

	WHITE	GREEN	RED	BROWN	BLUE	GREY	PURPLE	YELLOW
1x1	4	3	7	2	0	1	1	0
1x2	2	0	5	0	0	0	2	0
1x3	0	1	2	0	0	0	0	0
1x4	0	0	1	1	0	1	0	0
1x6	0	0	1	0	0	1	0	0
1x8	0	0	0	0	0	0	0	0
2x2	1	0	2	0	0	0	1	0
2x3	2	0	1	0	0	0	0	0
2x4	4	1	0	0	0	0	1	0
2x6	0	0	0	0	0	0	0	0
2x8	0	0	0	0	0	0	0	0
1x1 round	0	0	0	0	0	0	0	0

Cassiopeia A - Layer 13



- White = Si II
- Green = FeK
- Red = Ar II
- Brown = Ne II
- Blue = S I
- Grey = supporting structure
- Purple = Jets
- YELLOW STAR at 33P = reference point
- YELLOW round 1x1 = neutron star

BRICKS NEEDED FOR THIS LAYER:

	WHITE	GREEN	RED	BROWN	BLUE	GREY	PURPLE	YELLOW
1x1	3	1	4	3	2	0	0	0
1x2	2	1	8	2	0	0	3	0
1x3	2	0	1	0	0	0	0	0
1x4	0	0	0	0	0	1	0	0
1x6	1	0	0	0	0	0	0	0
1x8	3	0	0	0	0	0	0	0
2x2	0	0	1	0	0	1	0	0
2x3	1	1	0	0	0	0	0	0
2x4	0	0	1	0	0	0	1	0
2x6	1	0	0	0	0	0	0	0
2x8	0	0	0	0	0	0	0	0
1x1 round	0	0	0	0	0	0	0	0

Cassiopeia A - Layer 14



BRICKS NEEDED FOR THIS LAYER:

	WHITE	GREEN	RED	BROWN	BLUE	GREY	PURPLE	YELLOW
1x1	5	2	2	2	1	0	0	0
1x2	2	1	1	1	0	0	0	0
1x3	0	0	0	0	0	0	0	0
1x4	1	0	0	0	0	0	3	0
1x6	0	0	1	0	0	0	0	0
1x8	1	0	0	0	0	0	0	0
2x2	2	0	0	0	0	0	0	0
2x3	0	0	1	0	0	0	0	0
2x4	2	0	0	0	0	0	1	0
2x6	0	0	0	0	0	0	0	0
2x8	0	0	0	0	0	0	0	0
1x1 round	0	0	0	0	0	0	0	0