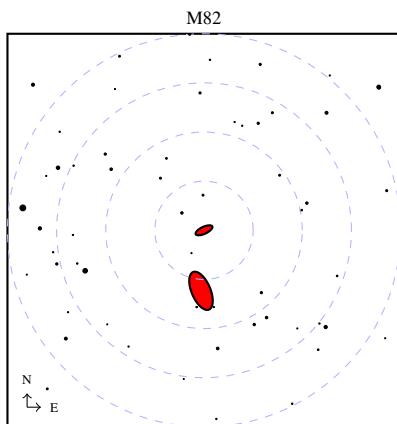
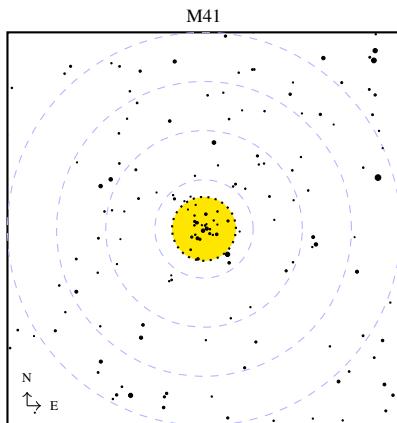


Pocket Finder-Chart Atlas



Alan Watson Forster

Pocket Finder-Chart Atlas

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Version 2022-02-19

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Preface

This is an atlas of finder charts for the Messier, Caldwell, and Astronomical League Urban Program objects. For each object, it gives a chart with a field of 4 degrees, flipped east-west, and showing stars to magnitude 9.5. The chart style follows the current conventions for all-sky atlases.

I created this atlas to assist me as I observed under the light-polluted skies of Mexico City with a 70 mm f/6 wide-field refractor. I don't use a finder with this telescope; instead, I star-hop using a low-power 32 mm eyepiece with a true field of about 4 degrees. Once I've found the field, I switch to a higher-power eyepiece with a true field of 1–2 degrees. Under my usual observing conditions, very few objects are immediately obvious, and the finder charts tell me when I've successfully star-hopped to the desired field and where to focus my efforts.

Of course, the obvious question is, but why not just use an all-sky atlas? I do indeed use one for star-hopping, but for confirming a field none of them combine adequate depth (to magnitude 9.5) with convenience at the telescope (small size and a binding that folds flat or, better, back on itself), and none really give me the sense of what I see through the telescope (the images are not flipped and bright stars are represented as too big).

Therefore, I created this atlas while guided by the following considerations. The charts should better approximate the view through the telescope at low power; they should be flipped, have a field of 4 degrees, show stars to 9.5 mag, and show the stars with smaller dots than typical. They should have a generous scale; I use 13 mm/deg throughout. They should complement the *Pocket Sky Atlas*, my favored all-sky atlas, by adopting a similar graphic design and showing similar objects. Finally, but no less importantly, they should be convenient to use at the telescope, with half-letter pages and a spiral binding that allows the atlas to fold back on itself, again to match the *Pocket Sky Atlas*.

To some degree, the relation between these finder charts and the *Pocket Sky Atlas* is similar to the relation between the large-scale and small-scale charts

in *The Observer's Sky Atlas*. The small-scale all-sky atlas is to find the field and the large-scale finder charts are to confirm the field and locate the object. (I don't use *The Observer's Sky Atlas* at the telescope, because the small-scale charts are too shallow and too narrow, the large-scale charts aren't flipped, and the binding is inconvenient.)

These finder charts have two known flaws. First, all objects are drawn as either ellipses (galaxies) or circles (everything else). This means, for example, that they do not correctly show the contours of M42 and M43. Second, they have no labels. To identify stars and neighboring objects, you will need to consult your all-sky atlas.

Chapter 1

The Messier Objects

The Messier objects are probably the most famous deep-sky objects. I find O'Meara's *Deep-Sky Companion: The Messier Objects* to be excellent on the origin of the catalog, the appearance of the objects, and their nature.

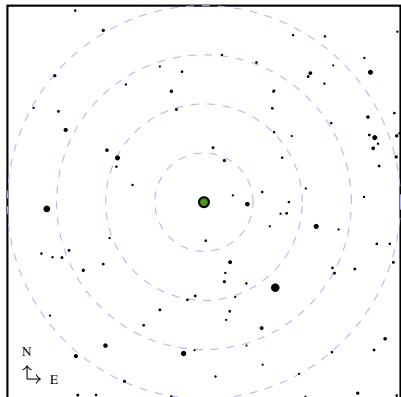
The following table lists the objects with their J2000 positions (hours and minutes of right ascension and decimal degrees of declination), the charts on which they appear in the *Pocket Sky Atlas*, their type, and any other names. I follow O'Meara in identifying M102 as NGC 5866.

For completeness, I include finder charts for all of the Messier objects, even bright ones like M45.

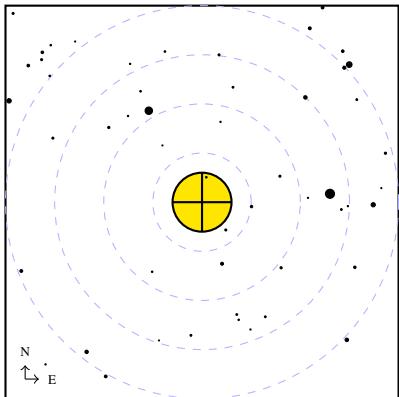
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M1	05 35 +22.0	14	BN	NGC 1952 / Crab Nebula
M2	21 33 -00.8	75/77	GC	U81 / NGC 7089
M3	13 42 +28.4	43/44	GC	U51 / NGC 5272
M4	16 24 -26.5	56/58	GC	U53 / NGC 6121
M5	15 19 +02.1	55/57	GC	U52 / NGC 5904
M6	17 40 -32.3	56/58/67/69	OC	U60 / NGC 6405 / Butterfly Cluster
M7	17 54 -34.8	58/67/69	OC	U62 / NGC 6475
M8	18 04 -24.4	67/69	BN	U64 / NGC 6523 / Lagoon Nebula
M9	17 19 -18.5	56	GC	NGC 6333
M10	16 57 -04.1	54/56	GC	U57 / NGC 6254
M11	18 51 -06.3	65/67	OC	U69 / NGC 6705 / Wild Duck Cluster
M12	16 47 -01.9	54/56	GC	U56 / NGC 6218
M13	16 42 +36.5	52	GC	U54 / NGC 6205 / Hercules Globular Cluster
M14	17 38 -03.2	54/56/67	GC	NGC 6402
M15	21 30 +12.2	75	GC	U80 / NGC 7078
M16	18 19 -13.8	67	OC/BN	NGC 6611 / Eagle Nebula
M17	18 21 -16.2	67	BN	U65 / NGC 6618 / Omega Nebula
M18	18 20 -17.1	67	OC	NGC 6613
M19	17 03 -26.3	56/58	GC	NGC 6273
M20	18 03 -23.0	67/69	BN	NGC 6514 / Trifid Nebula
M21	18 04 -22.5	67/69	OC	NGC 6531
M22	18 36 -23.9	67/69	GC	U67 / NGC 6656
M23	17 57 -19.0	67	OC	NGC 6494
M24	18 17 -18.6	67	SC	
M25	18 32 -19.1	67	OC	IC 4725
M26	18 45 -09.4	67	OC	NGC 6694
M27	20 00 +22.7	62/64	PN	U75 / NGC 6853 / Dumbbell Nebula
M28	18 25 -24.9	67/69	GC	NGC 6626
M29	20 24 +38.5	62/73	OC	NGC 6913
M30	21 40 -23.2	77	GC	NGC 7099
M31	00 43 +41.3	3/72	Gal	U3 / NGC 224 / Andromeda Galaxy
M32	00 43 +40.9	3/72	Gal	U2 / NGC 221
M33	01 34 +30.7	2/3/4/5	Gal	NGC 598 / Triangulum Galaxy
M34	02 42 +42.8	2/13	OC	NGC 1039
M35	06 09 +24.4	12/14/23/25	OC	U27 / NGC 2168
M36	05 36 +34.1	12/14	OC	U23 / NGC 1960
M37	05 52 +32.6	12/14/23/25	OC	U26 / NGC 2099
M38	05 29 +35.9	12/14	OC	U22 / NGC 1912
M39	21 32 +48.4	62/73	OC	U82 / NGC 7092
M40	12 22 +58.1	32/41/43	DS	
M41	06 46 -20.8	27	OC	U33 / NGC 2287
M42	05 35 -05.4	16/B	BN	U24 / NGC 1976 / Orion Nebula
M43	05 36 -05.3	16/B	BN	NGC 1982
M44	08 40 +19.7	24/35	OC	U39 / NGC 2632 / Beehive Cluster
M45	03 47 +24.1	13/15/A	OC	U17 / Pleiades
M46	07 42 -14.8	26/27	OC	NGC 2437
M47	07 37 -14.5	26/27	OC	NGC 2422
M48	08 14 -05.8	26	OC	U38 / NGC 2548
M49	12 30 +08.0	45/C	Gal	NGC 4472
M50	07 03 -08.4	27	OC	U35 / NGC 2323
M51	13 30 +47.2	32/43	Gal	NGC 5194 / Whirlpool Galaxy
M52	23 25 +61.6	3/71/72	OC	NGC 7654
M53	13 13 +18.2	45	GC	NGC 5024
M54	18 55 -30.5	67/69	GC	NGC 6715
M55	19 40 -31.0	66/68	GC	NGC 6809

Name	Position	PSA	Type	Other Names
M56	19 17 +30.2	63/65	GC	NGC 6779
M57	18 54 +33.0	63/65	PN	U71 / NGC 6720 / Ring Nebula
M58	12 38 +11.8	45/C	Gal	NGC 4579
M59	12 42 +11.6	45/C	Gal	NGC 4621
M60	12 44 +11.6	45/C	Gal	NGC 4649
M61	12 22 +04.5	45/47	Gal	NGC 4303
M62	17 01 -30.1	56/58	GC	U58 / NGC 6266
M63	13 16 +42.0	32/43	Gal	NGC 5055 / Sunflower Galaxy
M64	12 57 +21.7	45	Gal	U50 / NGC 4826 / Black-Eye Galaxy
M65	11 19 +13.1	34	Gal	NGC 3623
M66	11 20 +13.0	34	Gal	NGC 3627
M67	08 51 +11.8	24/35	OC	U40 / NGC 2682
M68	12 39 -26.7	47/49	GC	NGC 4590
M69	18 31 -32.3	67/69	GC	NGC 6637
M70	18 43 -32.3	67/69	GC	NGC 6681
M71	19 54 +18.8	64	GC	NGC 6838
M72	20 53 -12.5	66/77	GC	NGC 6981
M73	20 59 -12.6	66/77	Ast	NGC 6994
M74	01 37 +15.8	4/5	Gal	NGC 628
M75	20 06 -21.9	66	GC	NGC 6864
M76	01 42 +51.6	2/13	PN	NGC 650 / Little Dumbell
M77	02 43 -00.0	4/6	Gal	U12 / NGC 1068
M78	05 47 +00.1	14/16	BN	NGC 2068
M79	05 24 -24.5	16/18	GC	NGC 1904
M80	16 17 -23.0	56	GC	NGC 6093
M81	09 56 +69.1	21/31	Gal	U41 / NGC 3031
M82	09 56 +69.7	21/31	Gal	U42 / NGC 3034
M83	13 37 -29.9	46/47/48	Gal	NGC 5236
M84	12 25 +12.9	45/C	Gal	U45 / NGC 4374
M85	12 25 +18.2	45/C	Gal	NGC 4382
M86	12 26 +12.9	45/C	Gal	U46 / NGC 4406
M87	12 31 +12.4	45/C	Gal	U47 / NGC 4486
M88	12 32 +14.4	45/C	Gal	NGC 4501
M89	12 36 +12.6	45/C	Gal	NGC 4552
M90	12 37 +13.2	45/C	Gal	NGC 4569
M91	12 35 +14.5	45/C	Gal	NGC 4548
M92	17 17 +43.1	52/63	GC	U59 / NGC 6341
M93	07 44 -23.9	26/28	OC	NGC 2447
M94	12 51 +41.1	32/43	Gal	U49 / NGC 4736
M95	10 44 +11.7	34	Gal	NGC 3351
M96	10 47 +11.8	34	Gal	NGC 3368
M97	11 15 +55.0	32/43	PN	NGC 3587 / Owl Nebula
M98	12 14 +14.9	34/45/C	Gal	NGC 4192
M99	12 19 +14.4	45/C	Gal	NGC 4254
M100	12 23 +15.8	45/C	Gal	NGC 4321
M101	14 03 +54.3	32/42/53	Gal	NGC 5457
M102	15 06 +55.8	42/51/53	OC	NGC 5866
M103	01 33 +60.7	1/2/3/72	OC	NGC 581
M104	12 40 -11.6	47	Gal	U48 / NGC 4594 / Sombrero Galaxy
M105	10 48 +12.6	34	Gal	NGC 3379
M106	12 19 +47.3	32/43	Gal	NGC 4258
M107	16 33 -13.1	56	GC	NGC 6171
M108	11 11 +55.7	31/32/33/43	Gal	NGC 3556
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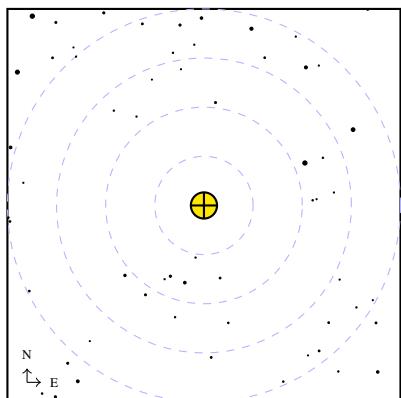
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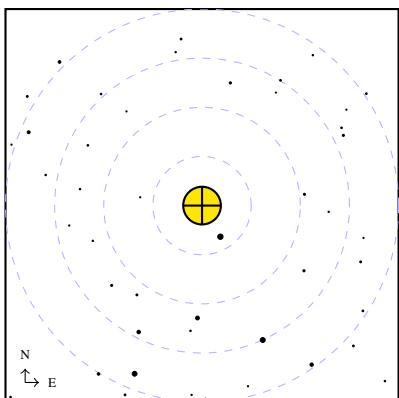
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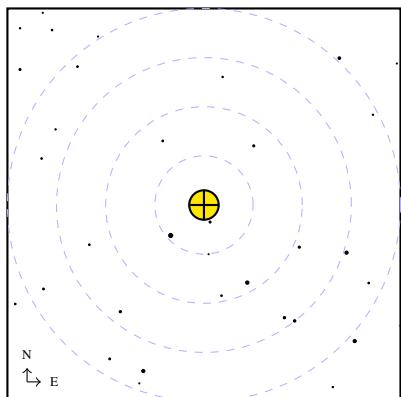
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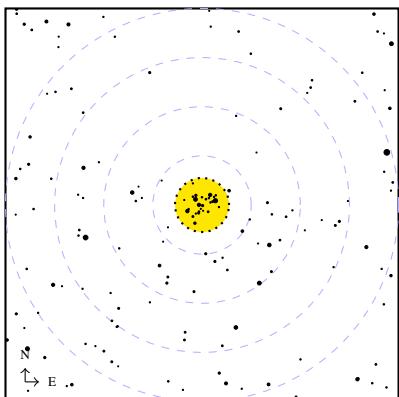
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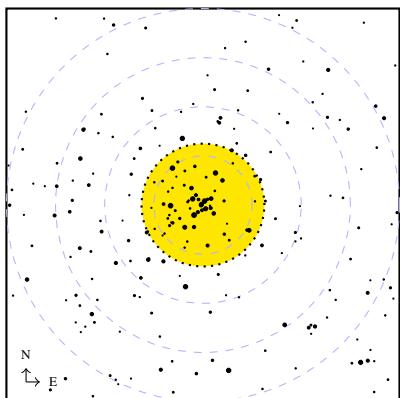
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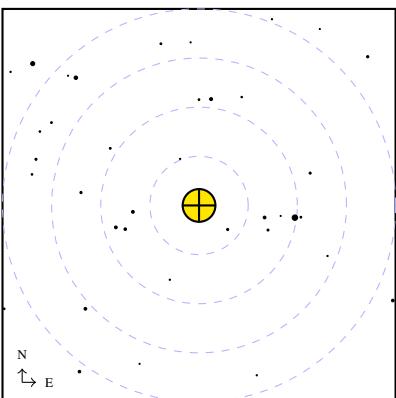
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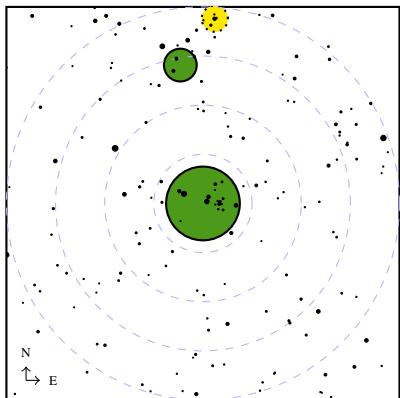
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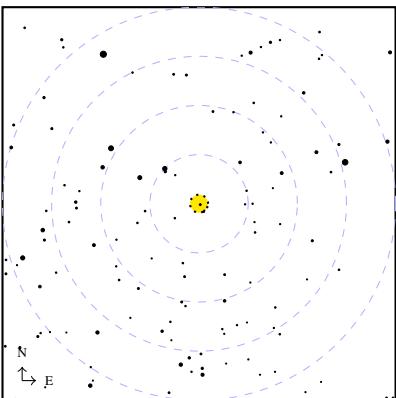
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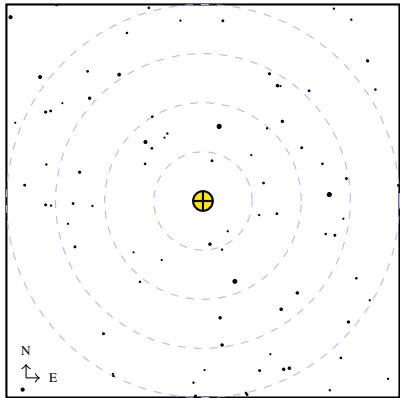
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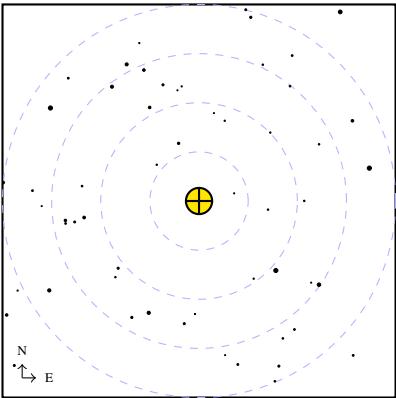
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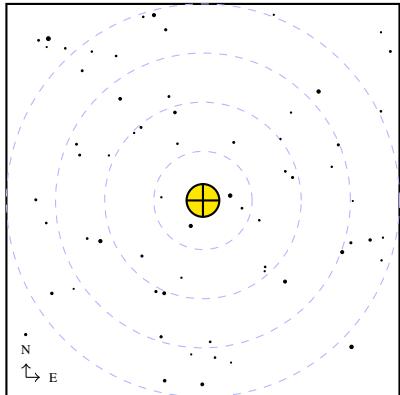
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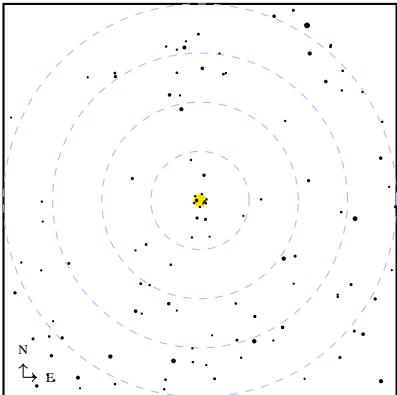
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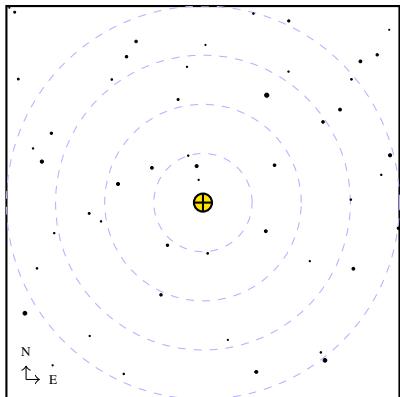
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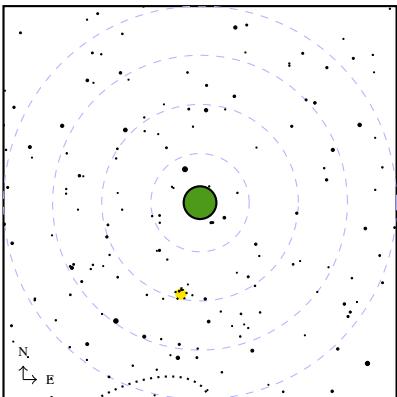
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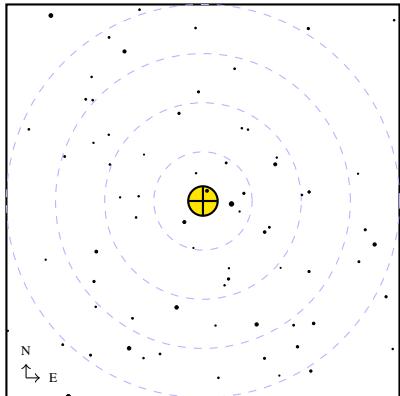
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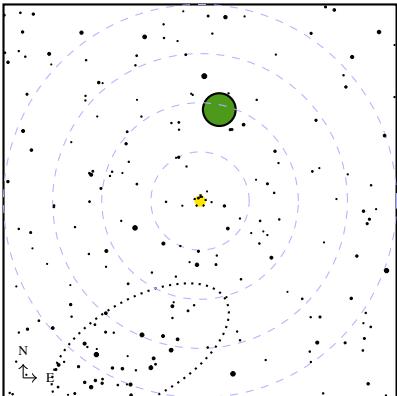
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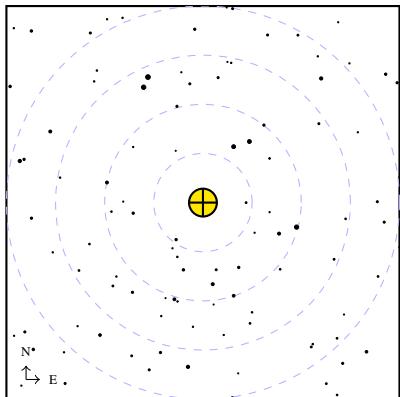
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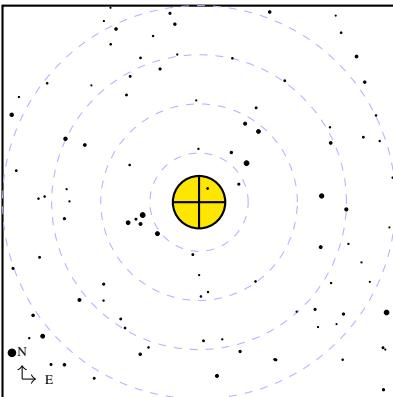
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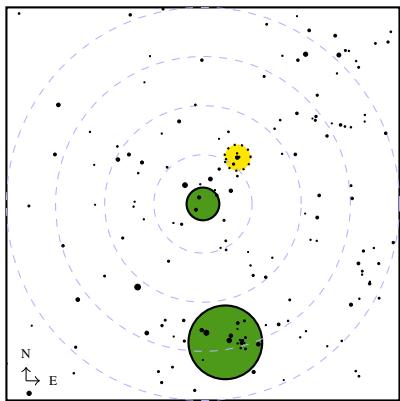
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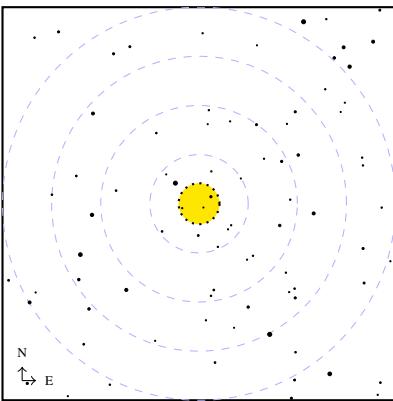
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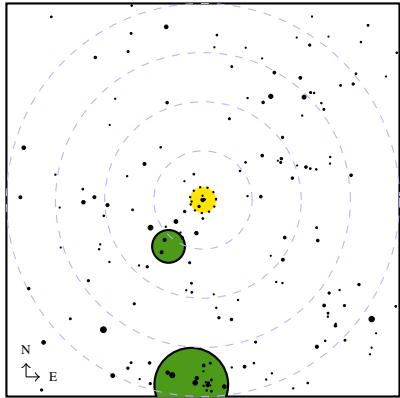
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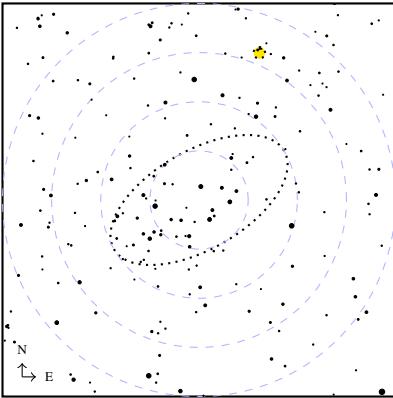
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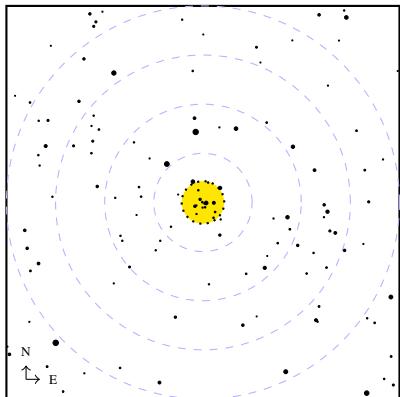
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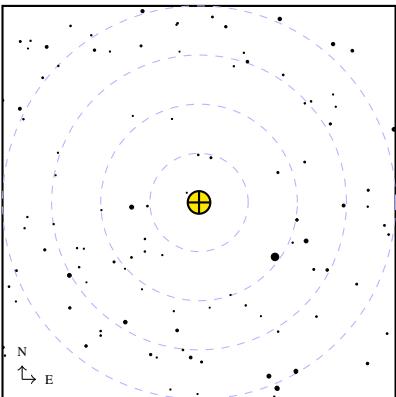
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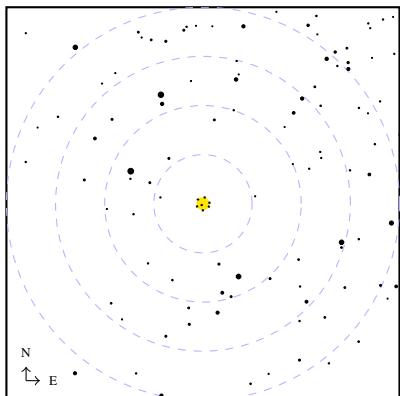
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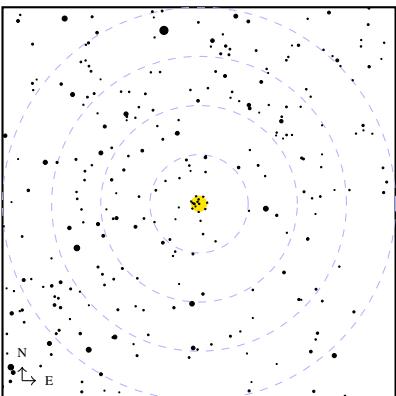
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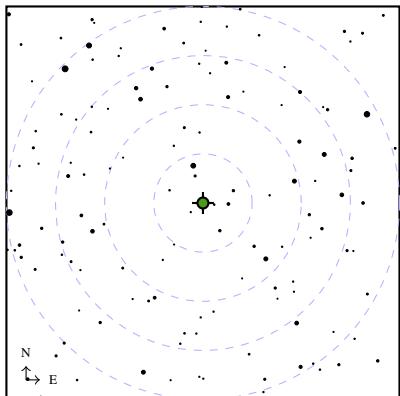
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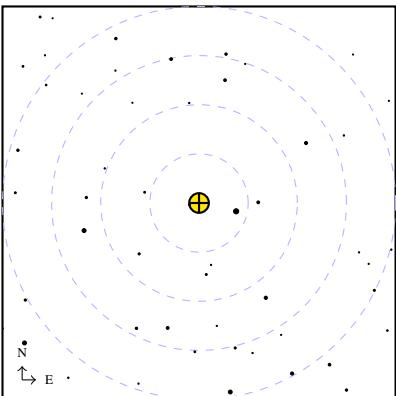
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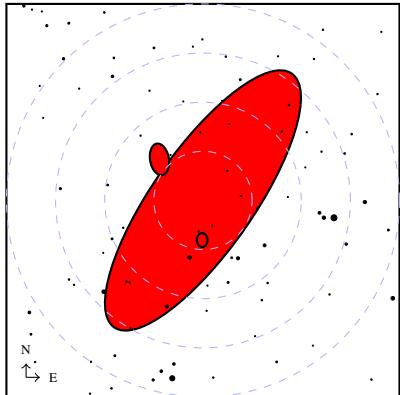
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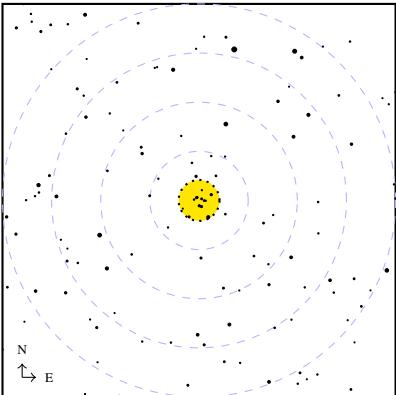
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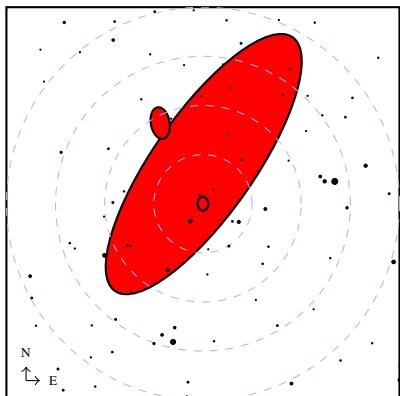
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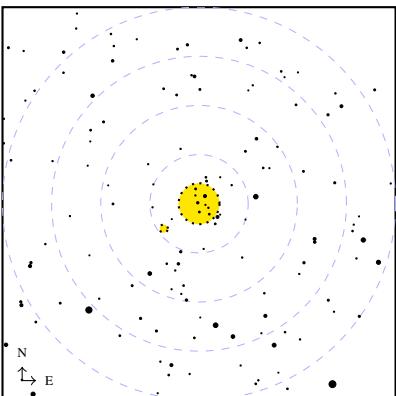
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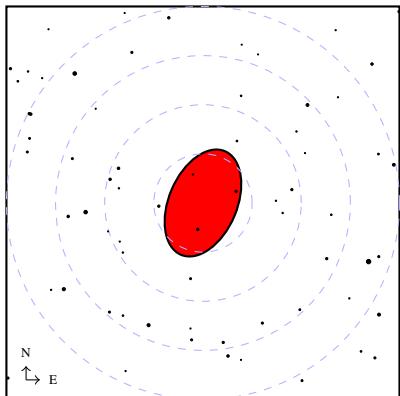
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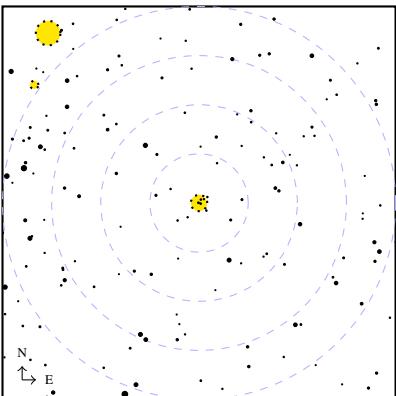
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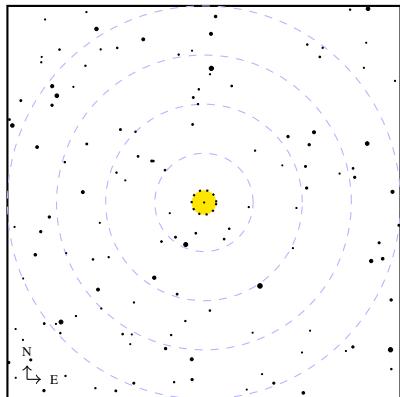
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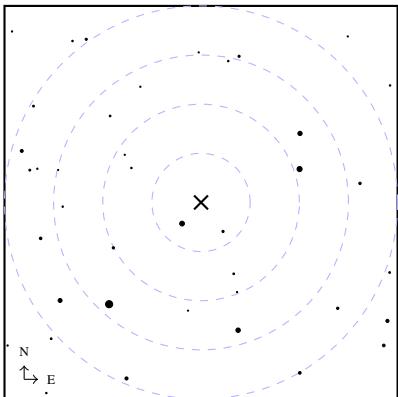
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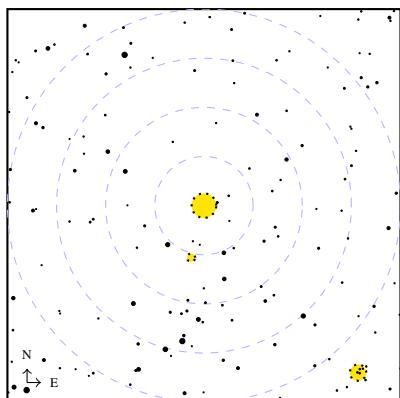
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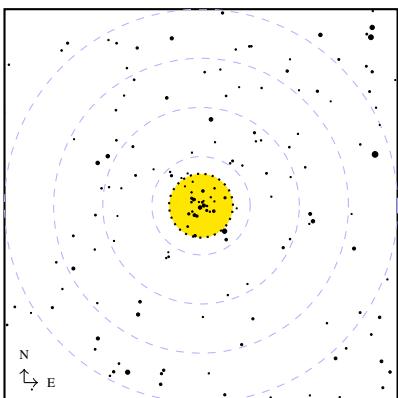
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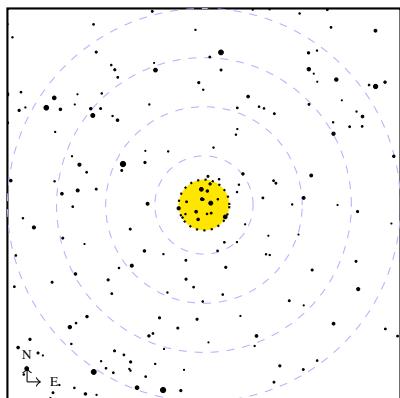
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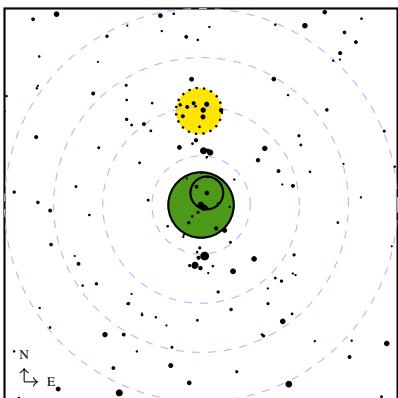
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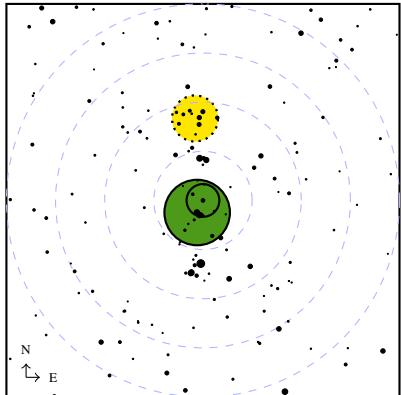
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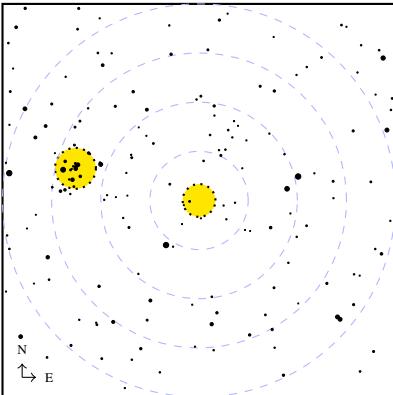
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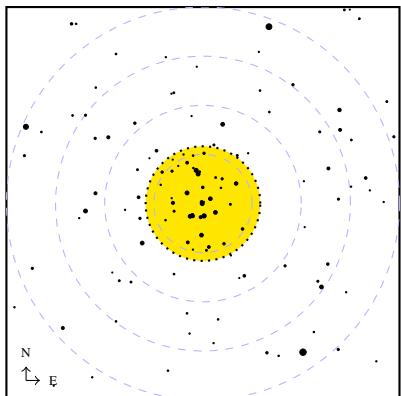
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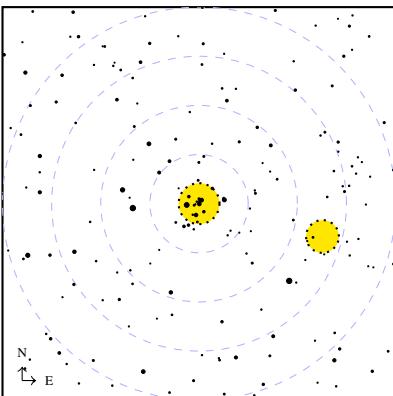
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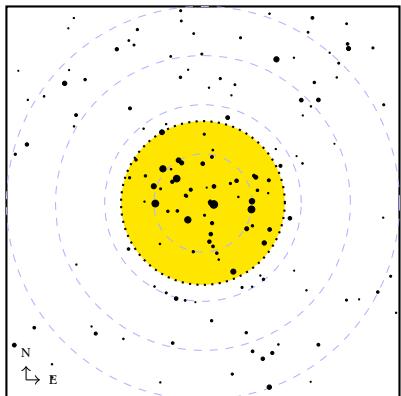
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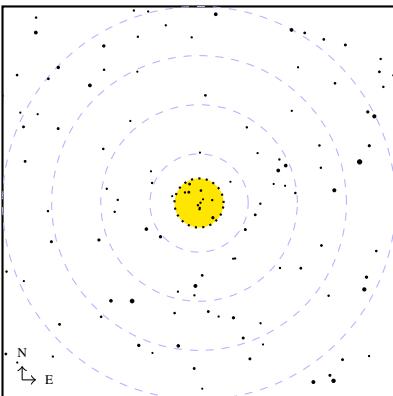
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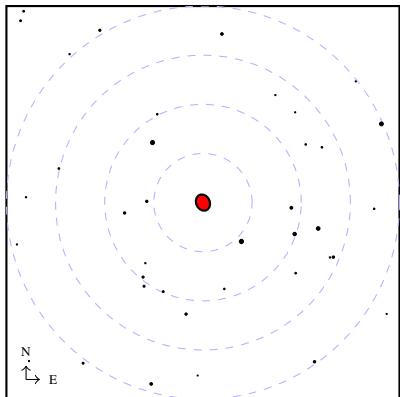
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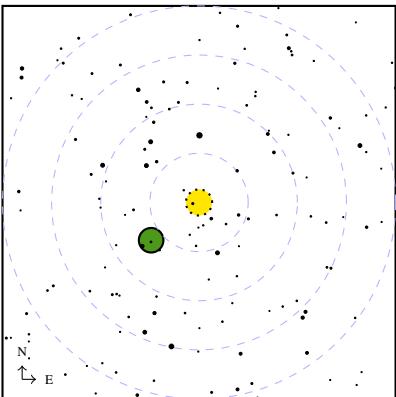
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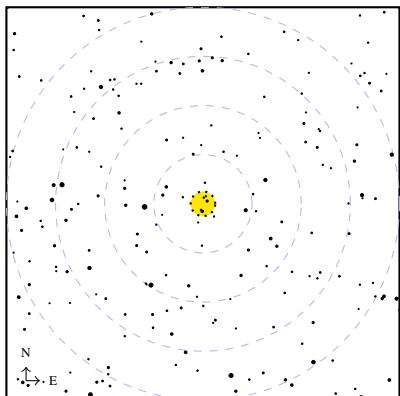
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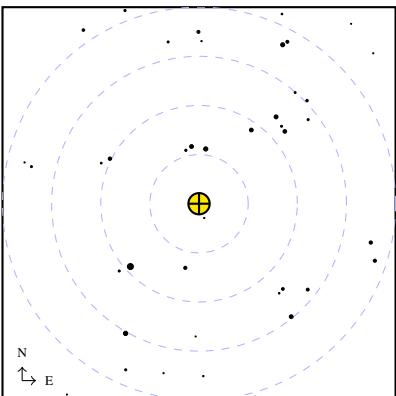
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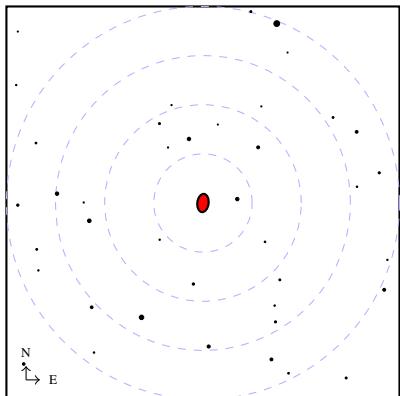
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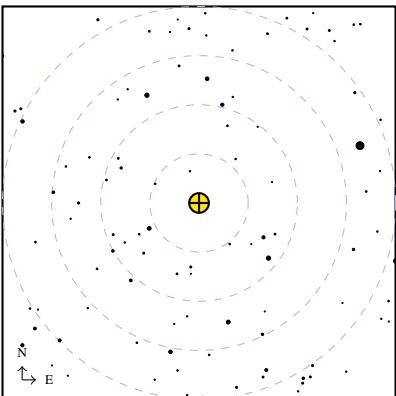
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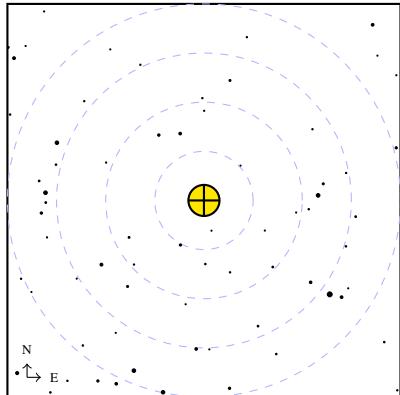
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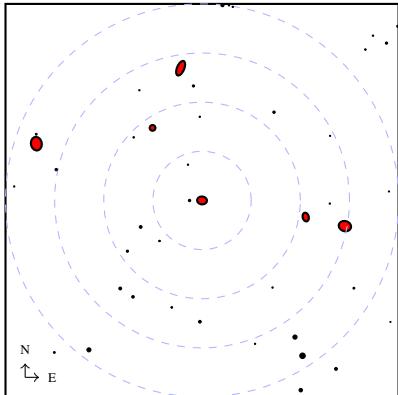
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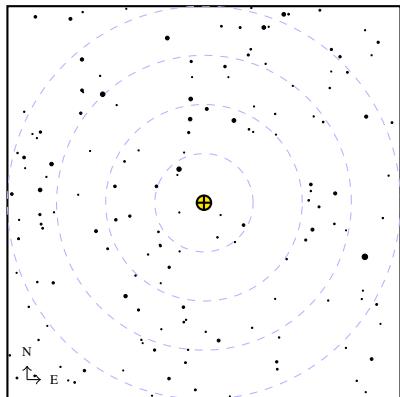
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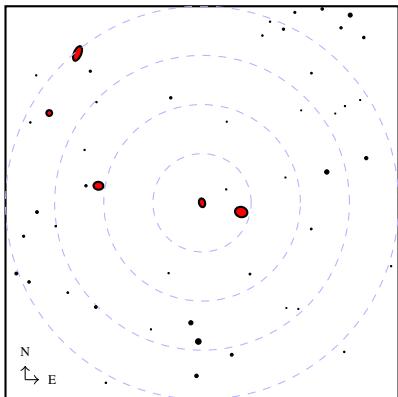
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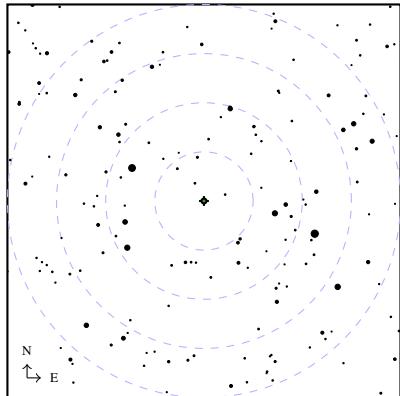
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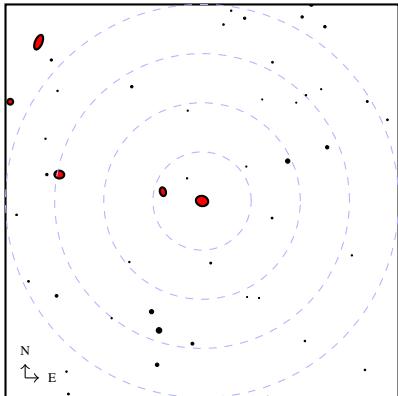
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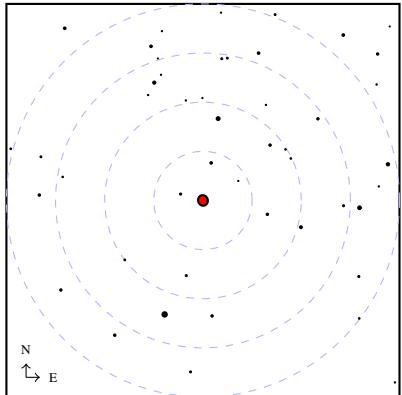
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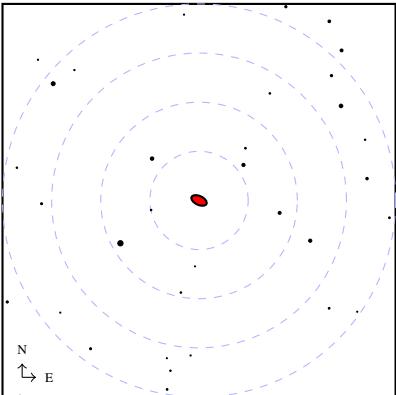
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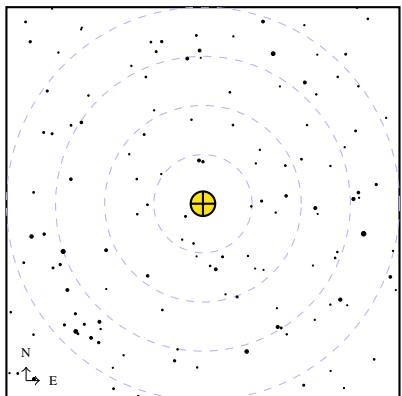
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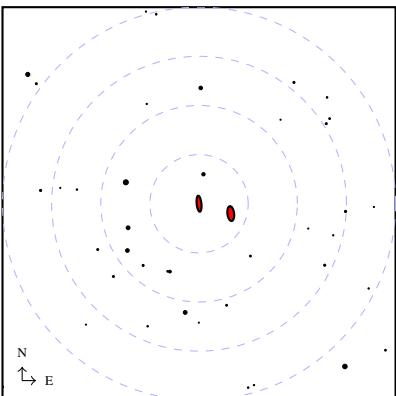
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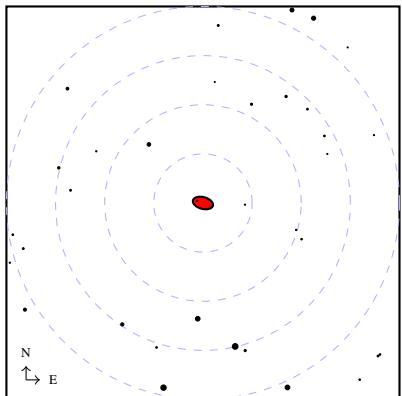
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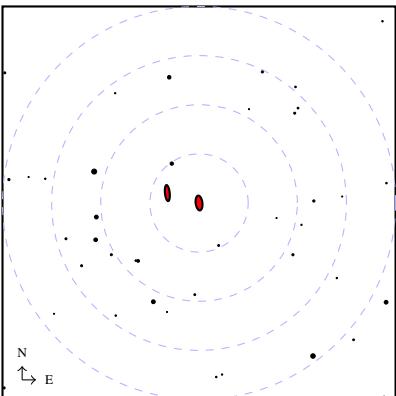
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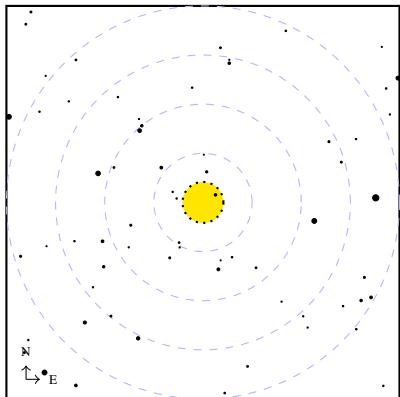
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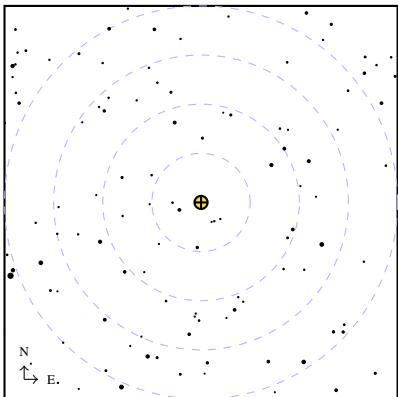
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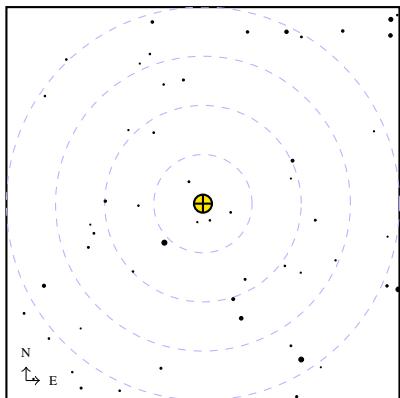
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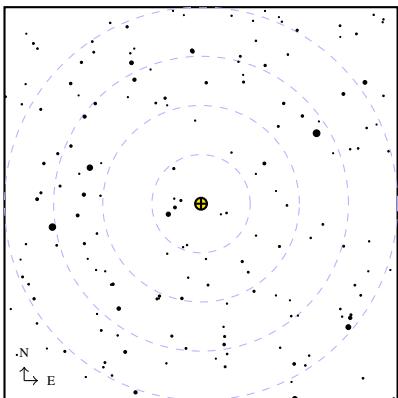
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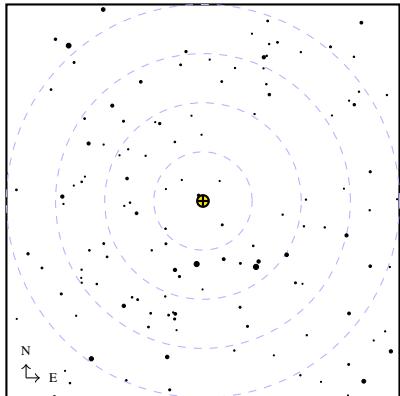
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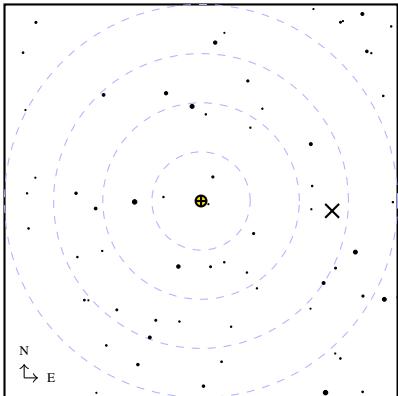
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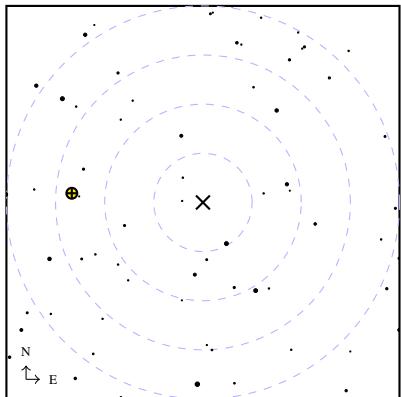
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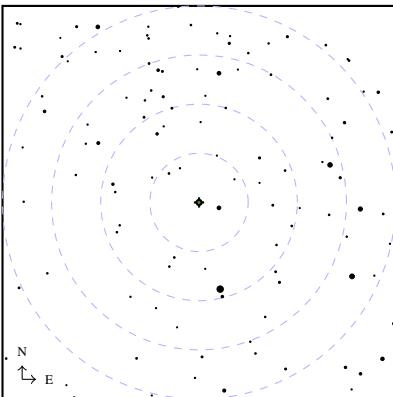
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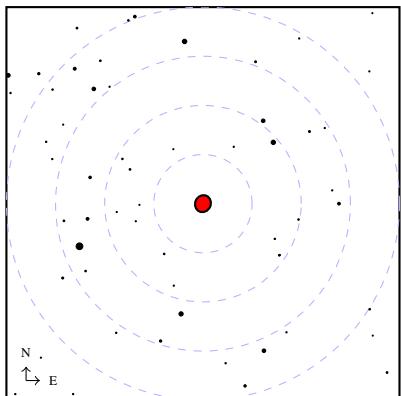
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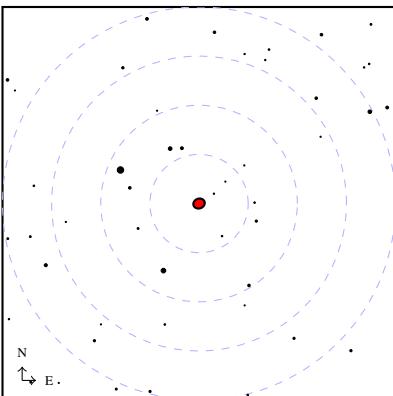
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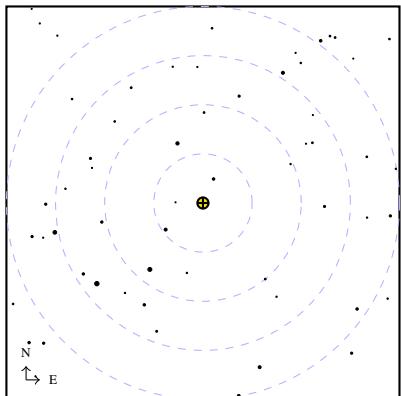
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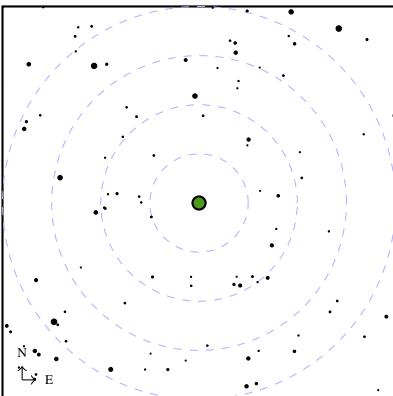
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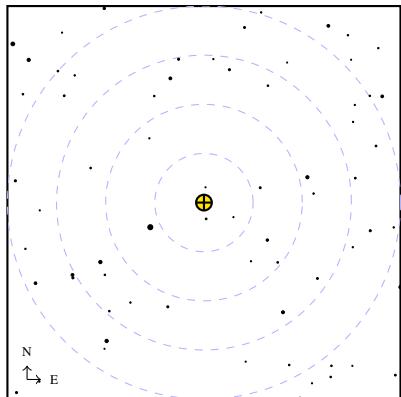
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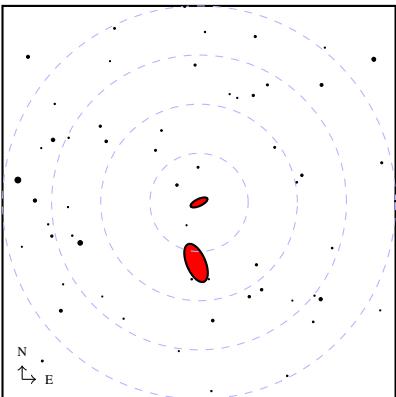
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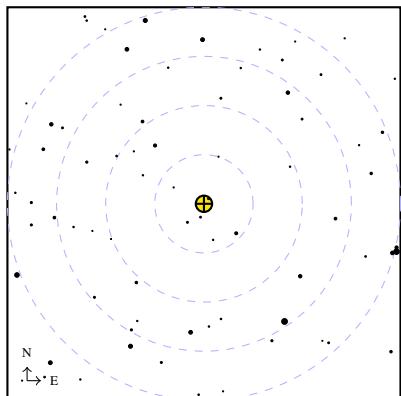
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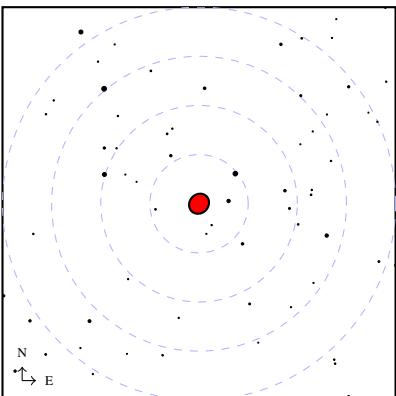
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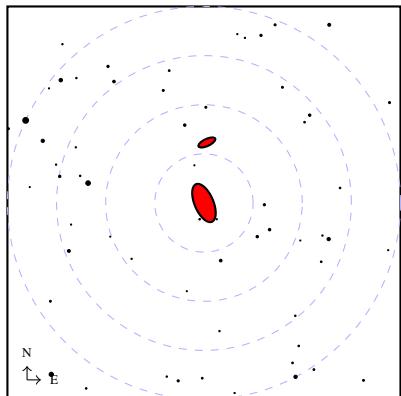
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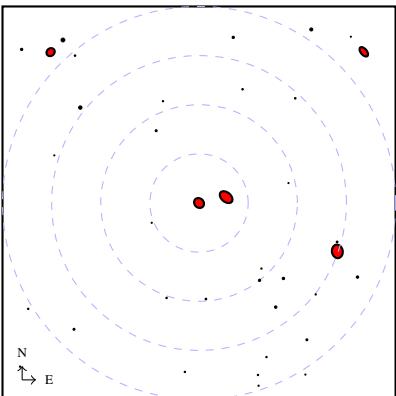
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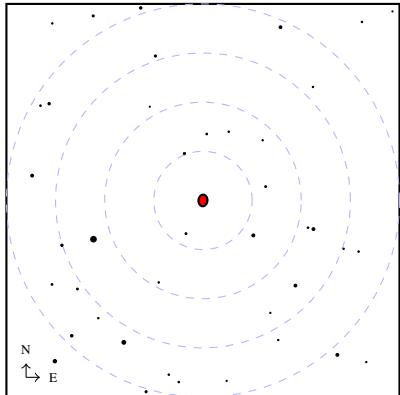
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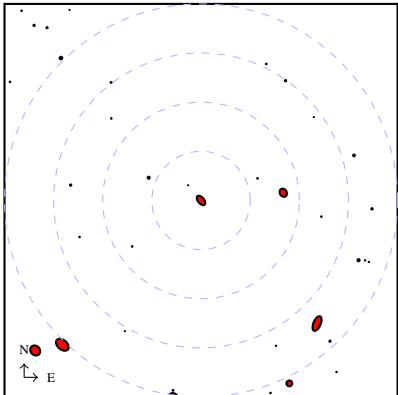
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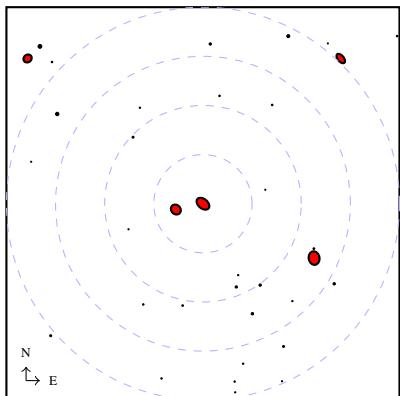
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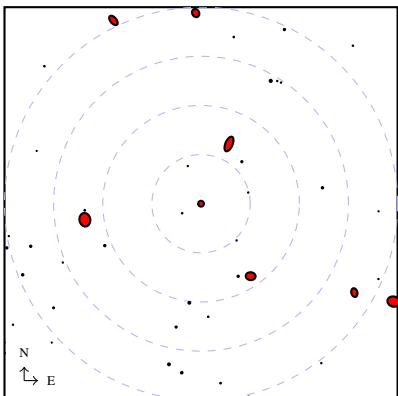
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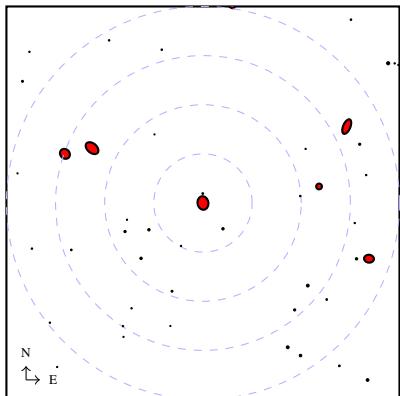
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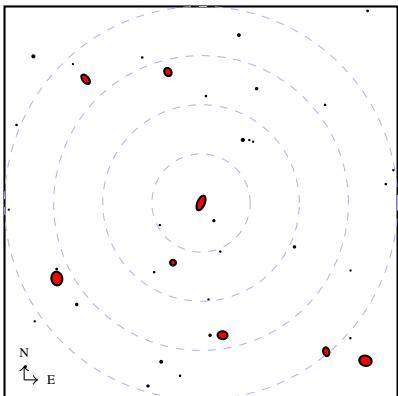
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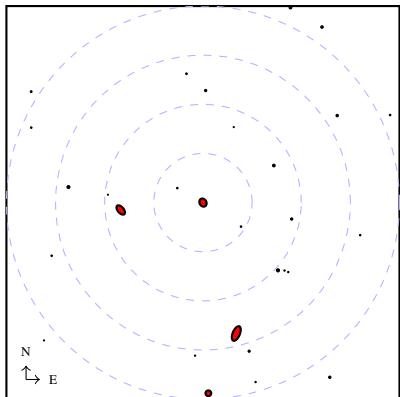
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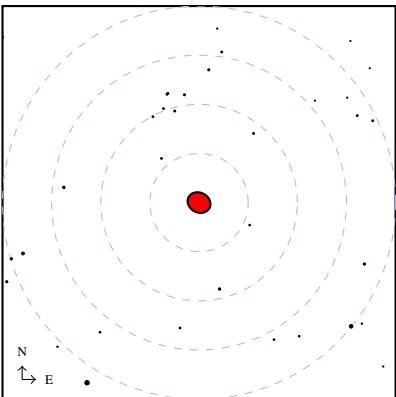
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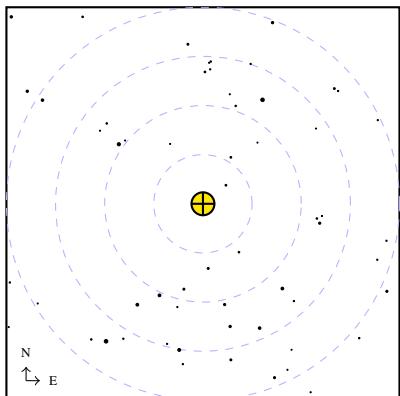
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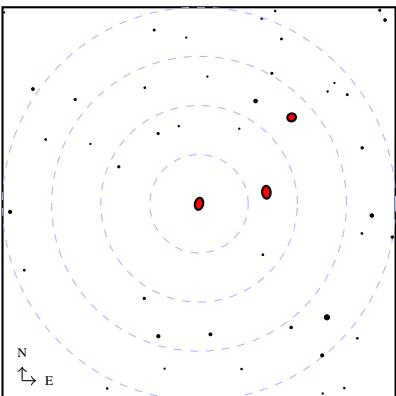
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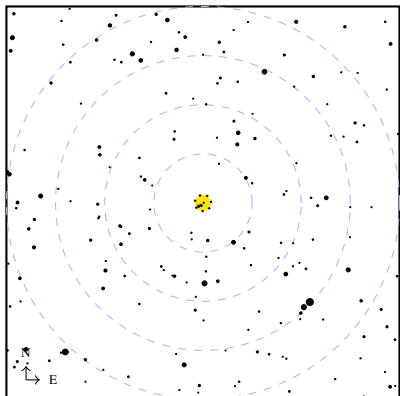
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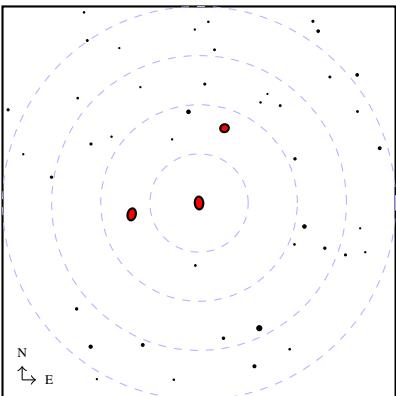
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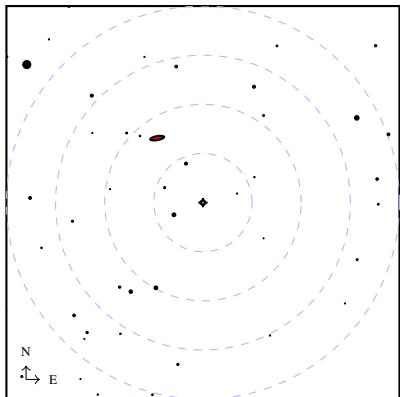
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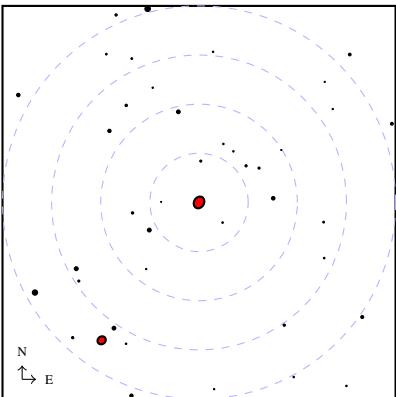
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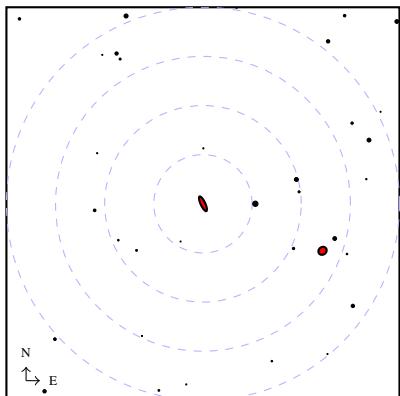
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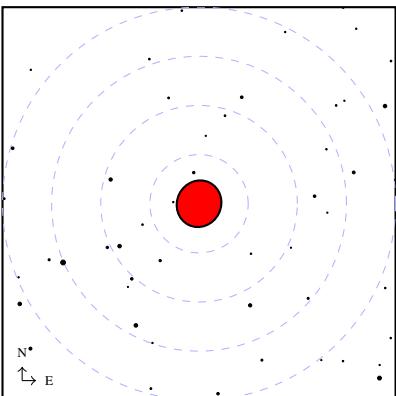
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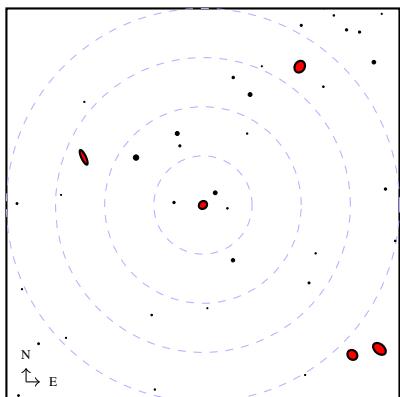
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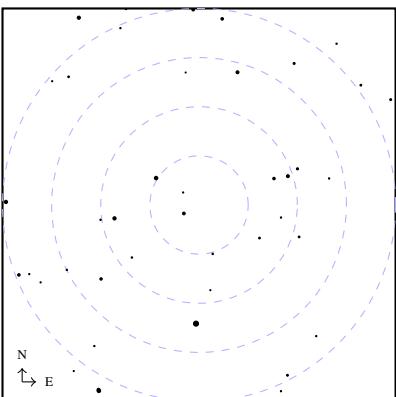
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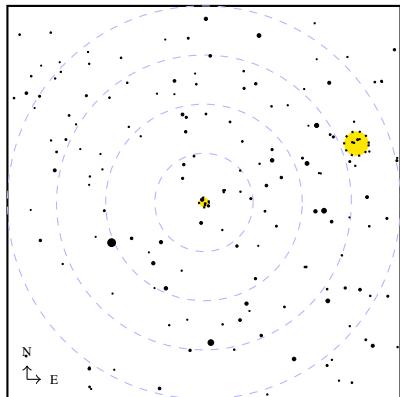
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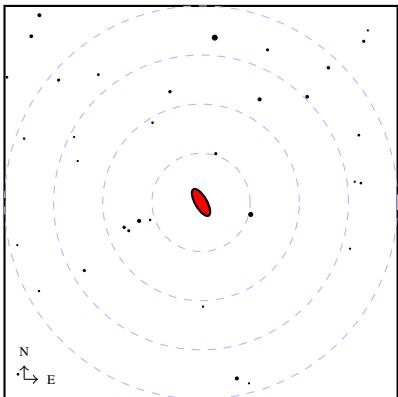
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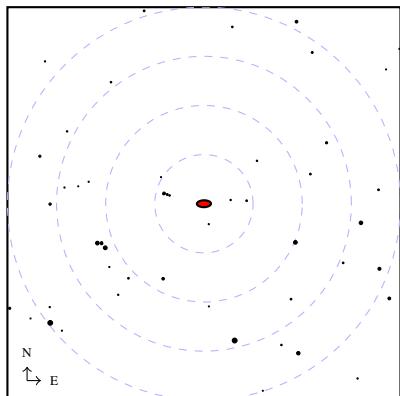
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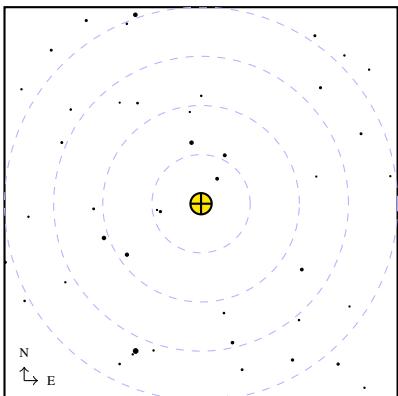
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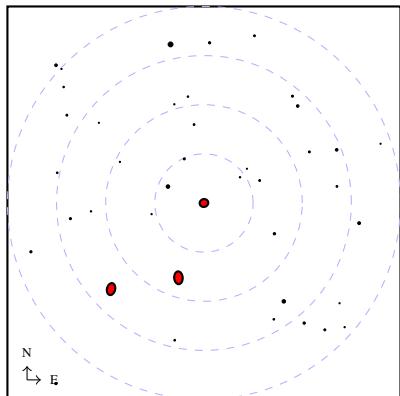
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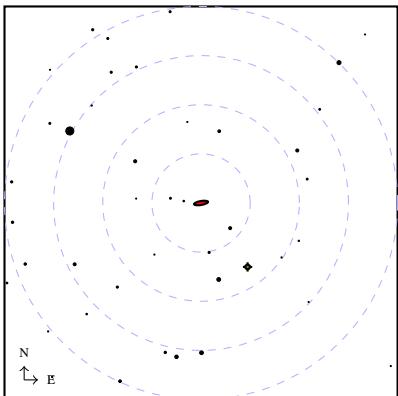
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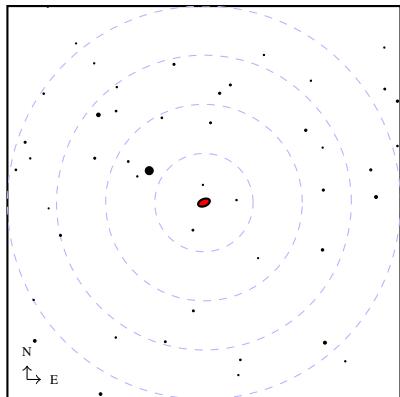
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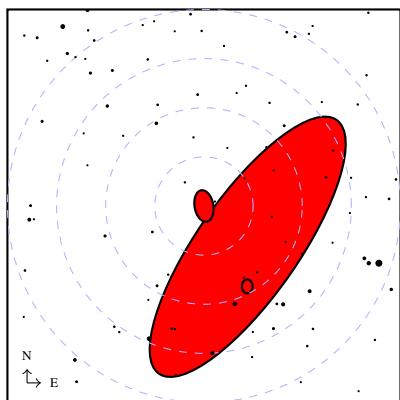
M108



M109



M110



Chapter 2

The Caldwell Objects

The Caldwell objects were selected by Patrick Moore to complement the Messier objects. Again, I find O'Meara's *Deep-Sky Companion: The Caldwell Objects* to be excellent on the origin of the catalog, the appearance of the objects, and their nature.

I use C1 to C109 to designate the Caldwell objects. This is common practice, but does not confirm to IAU recommendation on nomenclature, as O'Meara rightly notes (pp. 14–15).

The following table lists the objects with their J2000 positions (hours and minutes of right ascension and decimal degrees of declination), the charts on which they appear in the *Pocket Sky Atlas*, their type, and any other names. I follow the corrections given by O'Meara (p. 15) with regards to C37, C49, C89, and C100.

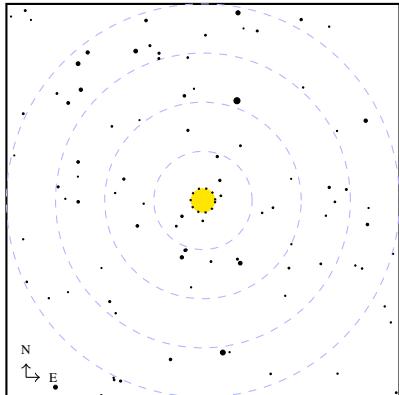
For completeness, I include finder charts for all of the Caldwell objects, even bright ones like C41 (the Hyades).

I note that C41 (the Hyades) and C99 (the Coalsack Nebula) are much bigger than the finder charts. They are really binocular objects and are better located using a small-scale all-sky atlas.

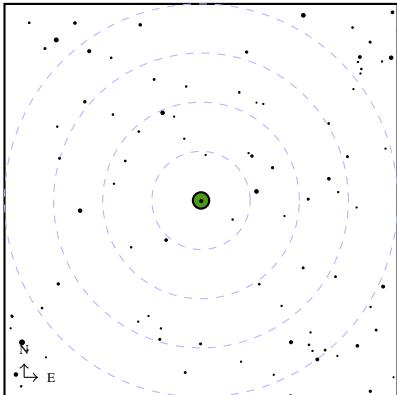
Name	Position	PSA	Type	Other Names
C1	00 48 +85.3	1/11/21/31/41/51/61/71	OC	NGC 188
C2	00 13 +72.5	1/71	PN	NGC 40 / Bow-Tie Nebula
C3	12 17 +69.5	31/41	Gal	NGC 4236
C4	21 02 +68.2	61/71	BN	NGC 7023 / Iris Nebula
C5	03 47 +68.1	1/11	Gal	IC 342 / Hidden Galaxy
C6	17 59 +66.6	51/61	PN	NGC 6543 / Cat's Eye Nebula
C7	07 37 +65.6	21	Gal	NGC 2403
C8	01 30 +63.3	1/2/3	OC	NGC 559
C9	22 57 +62.6	71/72	BN	Sh2-155 / Cave Nebula
C10	01 46 +61.2	1/2	OC	U5 / NGC 663
C11	23 21 +61.2	3/71/72	BN	NGC 7635 / Bubble Nebula
C12	20 35 +60.2	61/62/73	Gal	NGC 6946 / Fireworks Galaxy
C13	01 20 +58.3	1/3/72	OC	U4 / NGC 457 / Owl Cluster
C14	02 21 +57.1	1/2/13	OC	NGC 869/884 / h/χ Persei / Double Cluster
C15	19 45 +50.5	62/73	PN	U74 / NGC 6826 / Blinking Planetary
C16	22 15 +49.9	62/73	OC	U85 / NGC 7243
C17	00 33 +48.5	3/72	Gal	NGC 147
C18	00 39 +48.3	3/72	Gal	NGC 185
C19	21 53 +47.3	62/73	BN	IC 5146 / Cocoon Nebula
C20	20 59 +44.5	62/73	BN	NGC 7000 / North America Nebula
C21	12 28 +44.1	32/43	Gal	NGC 4449
C22	23 26 +42.5	3/72	PN	U86 / NGC 7662 / Blue Snowball
C23	02 23 +42.3	2/13	Gal	NGC 891 / Silver Sliver Galaxy
C24	03 20 +41.5	2/13	Gal	NGC 1275 / Perseus A
C25	07 38 +38.9	23	GC	NGC 2419
C26	12 17 +37.8	32/43	Gal	NGC 4244
C27	20 12 +38.4	62/73	BN	NGC 6888 / Crescent Nebula
C28	01 58 +37.8	2	OC	U7 / NGC 752
C29	13 11 +37.1	32/43	Gal	NGC 5005
C30	22 37 +34.4	72/74/75	Gal	NGC 7331
C31	05 16 +34.4	12/14	BN	IC 405 / Flaming Star Nebula
C32	12 42 +32.5	32/43/45	Gal	NGC 4631 / Whale Galaxy
C33	20 56 +31.7	62/64/73/75	BN	NGC 6993/6995 / Eastern Veil Nebula
C34	20 46 +30.7	62/64/73/75	BN	NGC 6960 / Western Veil Nebula
C35	13 00 +28.0	32/43/45	Gal	NGC 4889 / Coma B
C36	12 36 +28.0	32/43/45	Gal	NGC 4559
C37	20 12 +26.5	62/64	OC	NGC 6885
C38	12 36 +26.0	32/43/45	Gal	NGC 4565 / Needle Galaxy
C39	07 29 +20.9	25	PN	U36 / NGC 2392 / Eskimo Nebula
C40	11 20 +18.4	34	Gal	NGC 3626
C41	04 27 +15.9	15	OC	U18 / Mel 25 / Cr 50 / Hyades
C42	21 01 +16.2	64/75	GC	NGC 7006
C43	00 03 +16.1	5/74	Gal	NGC 7814
C44	23 05 +12.3	74	Gal	NGC 7479
C45	13 38 +08.9	44	Gal	NGC 5248
C46	06 39 +08.7	25	BN	NGC 2261 / Hubble's Variable Nebula
C47	20 34 +07.4	64	GC	U77 / NGC 6934
C48	09 10 +07.0	24/35	Gal	NGC 2775
C49	06 32 +05.0	25	BN	NGC 2237 / Rosette Nebula
C50	06 32 +04.9	25	OC	U30 / NGC 2244 / Satellite Cluster
C51	01 05 +02.1	5/7	Gal	IC 1613
C52	12 49 -05.8	45/47	Gal	NGC 4697
C53	10 05 -07.7	37	Gal	NGC 3115 / Spindle Galaxy
C54	08 00 -10.8	26	OC	NGC 2506
C55	21 04 -11.4	77	PN	U79 / NGC 7009 / Saturn Nebula

Name	Position	PSA	Type	Other Names
C56	00 47 –11.9	7	PN	NGC 246 / Skull Nebula
C57	19 45 –14.8	66	Gal	NGC 6822 / Barnard's Galaxy
C58	07 18 –15.6	27	OC	NGC 2360 / Caroline's Cluster
C59	10 25 –18.6	36/37	PN	U43 / NGC 3242 / Ghost of Jupiter
C60	12 02 –18.9	36/47	Gal	NGC 4038 / Antenna Galaxies
C61	12 02 –18.9	36/47	Gal	NGC 4039 / Antenna Galaxies
C62	00 47 –20.8	7	Gal	NGC 247
C63	22 30 –20.8	76/77	PN	NGC 7293 / Helix Nebula
C64	07 19 –25.0	27/29	OC	NGC 2362 / Tau Canis Majoris Cluster
C65	00 48 –25.3	79	Gal	NGC 253 / Sculptor Galaxy
C66	14 40 –26.5	46/48/57/59	GC	NGC 5694
C67	02 46 –30.3	6/8/17/19	Gal	NGC 1097
C68	19 02 –37.0	67/69	BN	NGC 6729 / R Corona Australis Nebula
C69	17 14 –37.1	58	PN	NGC 6302 / Bug Nebula
C70	00 55 –37.7	9	Gal	NGC 300
C71	07 52 –38.5	28	OC	NGC 2477
C72	00 15 –39.2	9/78	Gal	NGC 55
C73	05 14 –40.0	18	GC	NGC 1851
C74	10 07 –40.4	39	PN	NGC 3132 / Eight Burst Nebula
C75	16 25 –40.7	58	OC	NGC 6124
C76	16 54 –41.8	58	OC	NGC 6231
C77	13 25 –43.0	48/49	Gal	NGC 5128 / Centaurus A
C78	18 08 –43.7	58/69	GC	NGC 6541
C79	10 18 –46.4	39	GC	NGC 3201
C80	13 27 –47.5	48/49/59	GC	NGC 5139 / Omega Centauri
C81	17 25 –48.4	58/69	GC	NGC 6352
C82	16 41 –48.8	58	OC	NGC 6193
C83	13 05 –49.5	38/49	Gal	NGC 4945
C84	13 46 –51.4	48/59	GC	NGC 5286
C85	08 40 –52.9	28/39	OC	IC 2391 / o Velorum Cluster
C86	17 41 –53.7	58/69	GC	NGC 6397
C87	03 12 –55.2	8/19/20	GC	NGC 1261
C88	15 06 –55.6	48/59/60	OC	NGC 5823
C89	16 19 –57.9	48/58/60	OC	NGC 6087 / S Normae Cluster
C90	09 21 –58.3	28/39/40	PN	NGC 2867
C91	11 06 –58.7	38/40/49	OC	NGC 3532 / Wishing Well Cluster
C92	10 45 –59.9	38/40/49	BN	NGC 3372 / η Carinae Nebula
C93	19 11 –60.0	69/70	GC	NGC 6752 / Great Peacock Nebula
C94	12 54 –60.4	38/49/50	OC	NGC 4755 / Jewel Box
C95	16 03 –60.4	60	OC	NGC 6025
C96	07 58 –60.8	28/30/39	OC	NGC 2516 / Southern Beehive Cluster
C97	11 36 –61.6	38/40/49	OC	NGC 3766 / Pearl Cluster
C98	12 42 –63.0	38/49/50	OC	NGC 4609
C99	12 53 –63.0	38/49/50	DN	Coalsack Nebula
C100	11 36 –63.0	38/40/49/50	OC	IC 2944 / λ Centauri Nebula
C101	19 10 –63.9	70	SG	NGC 6744
C102	10 43 –64.4	38/40	OC	IC 2602 / θ Carinae Cluster
C103	05 39 –69.1	20/30/D	BN	NGC 2070 / Tarantula Nebula
C104	01 03 –70.8	10/20/80	GC	NGC 362
C105	13 00 –70.9	40/50	GC	NGC 4833
C106	00 24 –72.1	10/80	GC	NGC 104 / 47 Tucanae
C107	16 26 –72.2	50/60/70	GC	NGC 6101
C108	12 26 –72.7	40/50	GC	NGC 4372
C109	10 09 –80.9	10/20/30	PN	NGC 3195

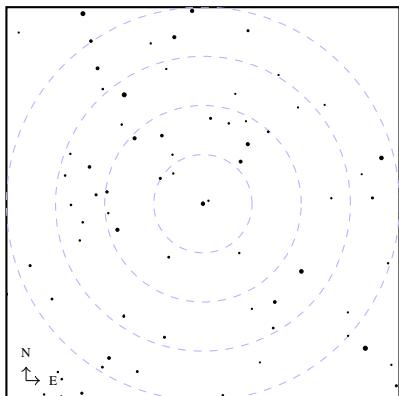
C1 = NGC 188



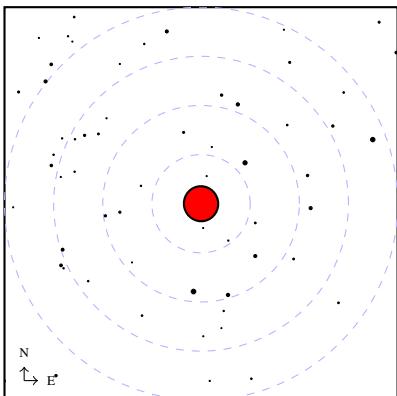
C4 = NGC 7023



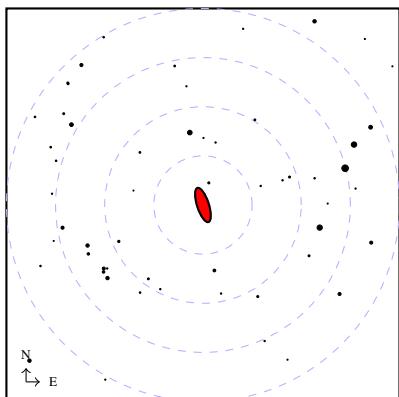
C2 = NGC 40



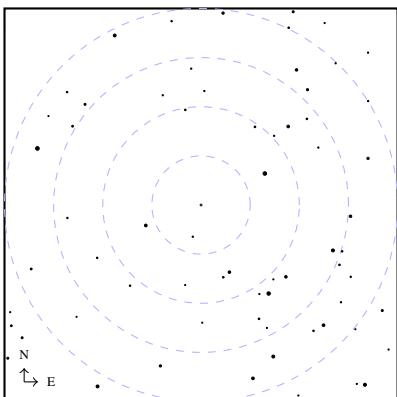
C5 = IC 342



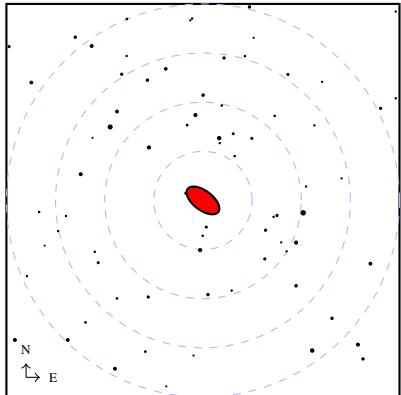
C3 = NGC 4236



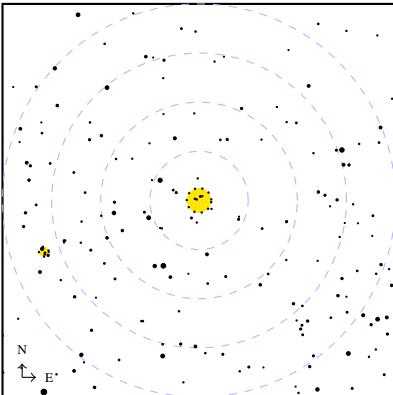
C6 = NGC 6543



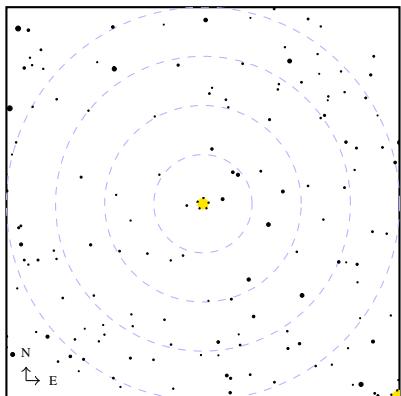
C7 = NGC 2403



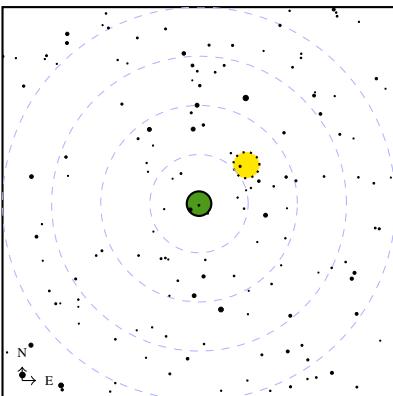
C10 = NGC 663



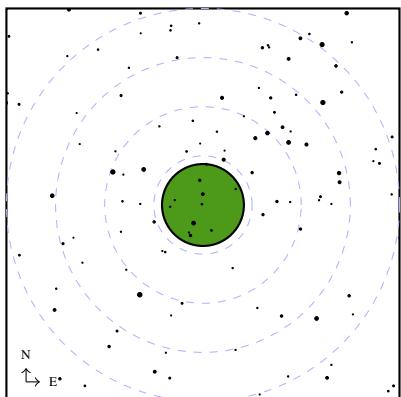
C8 = NGC 559



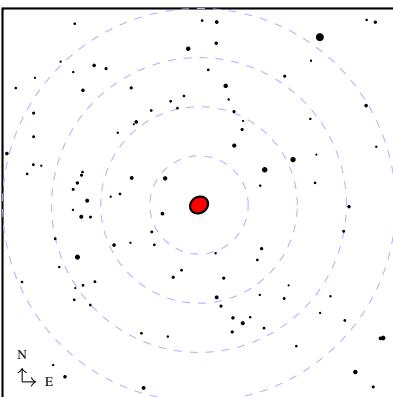
C11 = NGC 7635



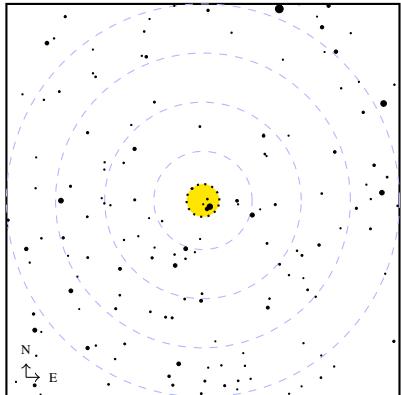
C9 = Sh2-155



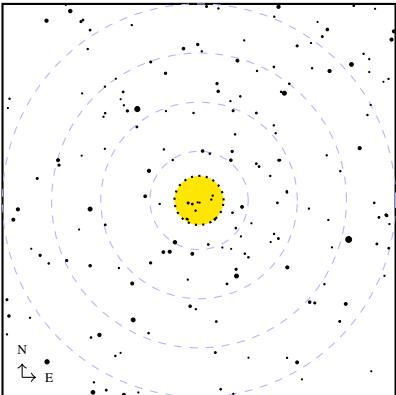
C12 = NGC 6946



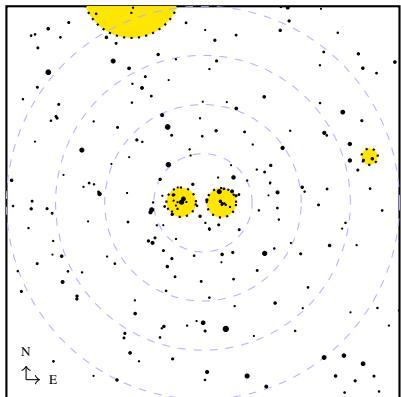
C13 = NGC 457



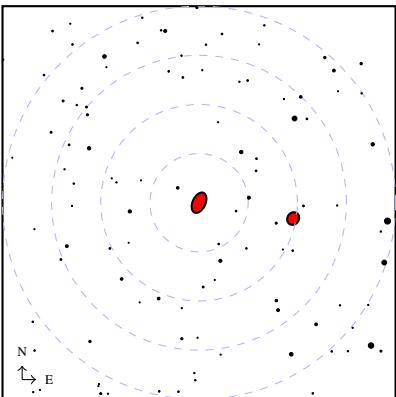
C16 = NGC 7243



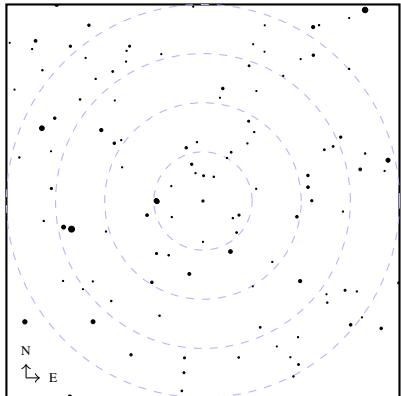
C14 = NGC 869/884



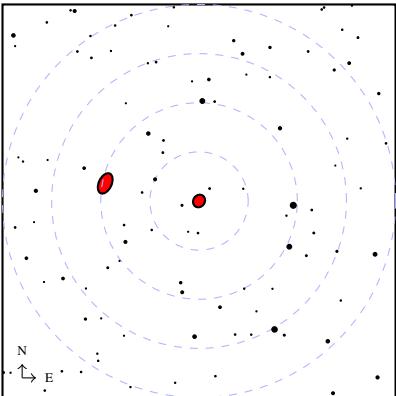
C17 = NGC 147



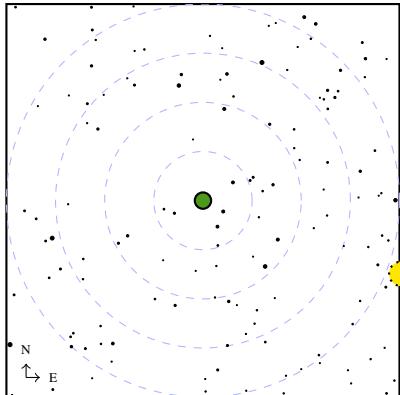
C15 = NGC 6826



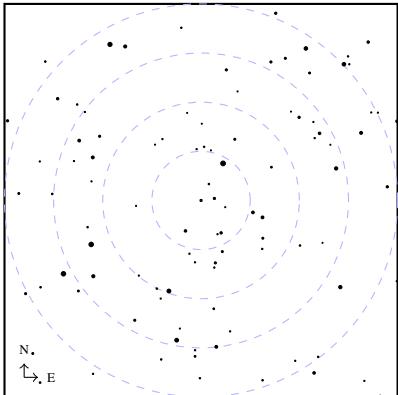
C18 = NGC 185



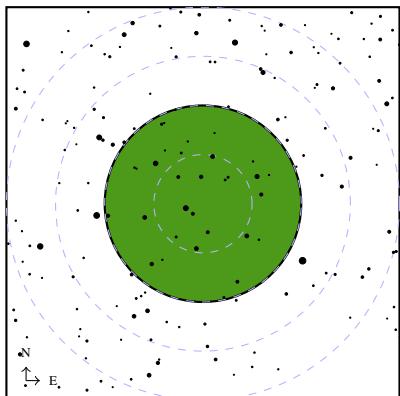
C19 = IC 5146



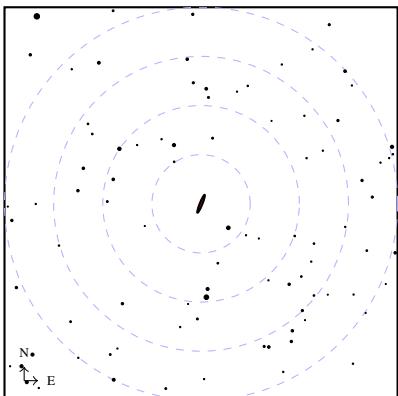
C22 = NGC 7662



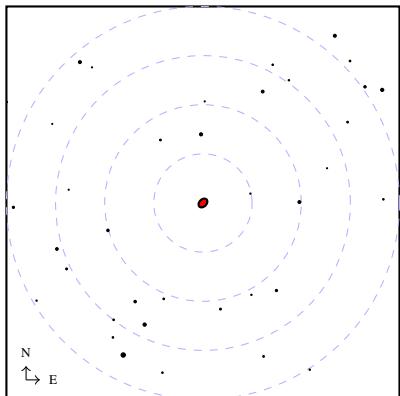
C20 = NGC 7000



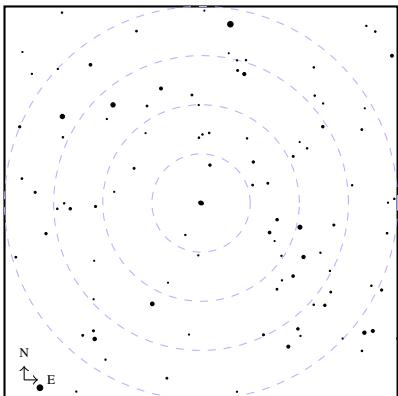
C23 = NGC 891



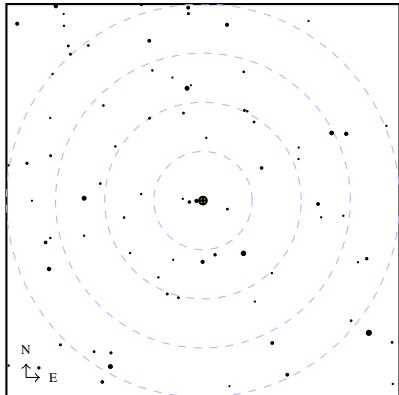
C21 = NGC 4449



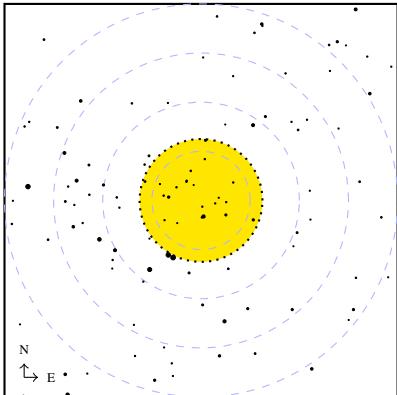
C24 = NGC 1275



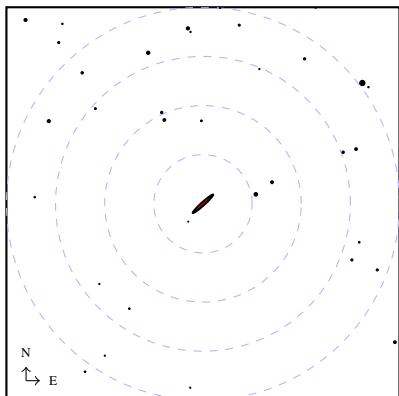
C25 = NGC 2419



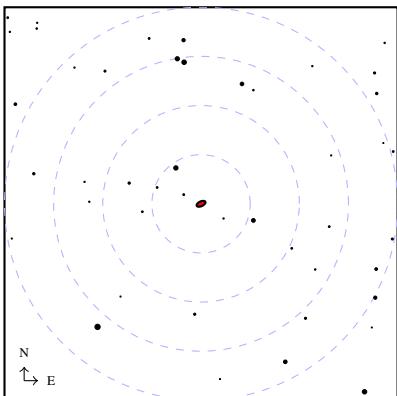
C28 = NGC 752



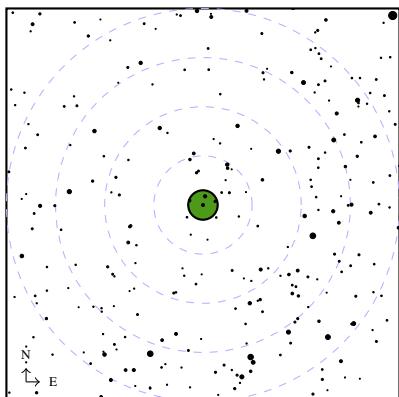
C26 = NGC 4244



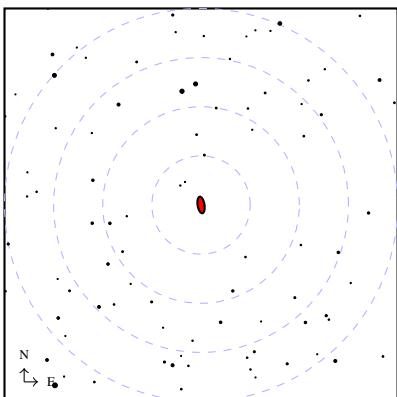
C29 = NGC 5005



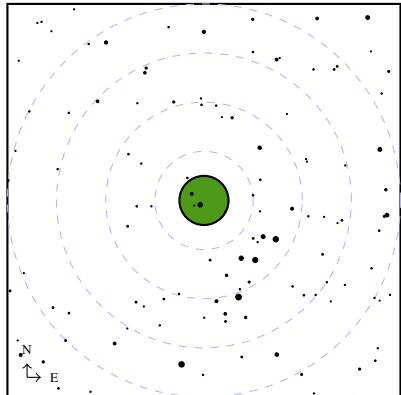
C27 = NGC 6888



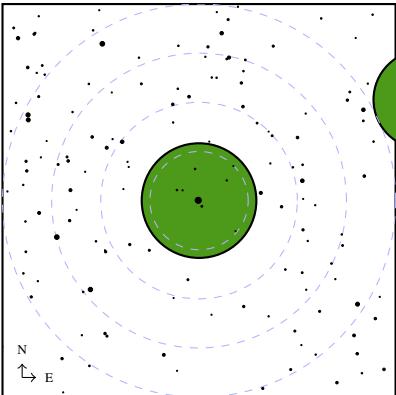
C30 = NGC 7331



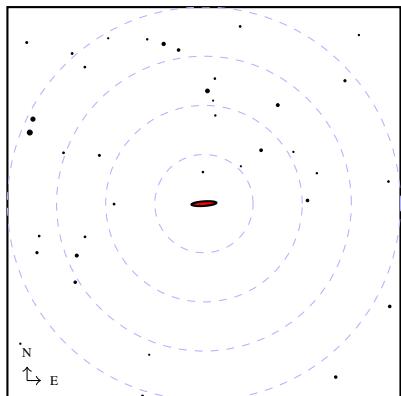
C31 = IC 405



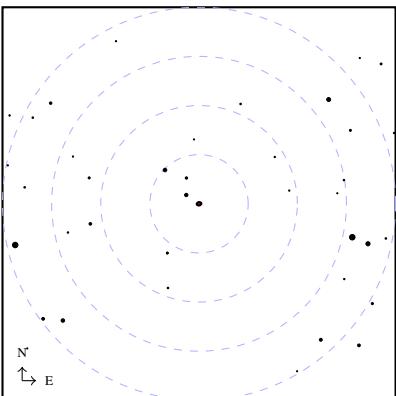
C34 = NGC 6960



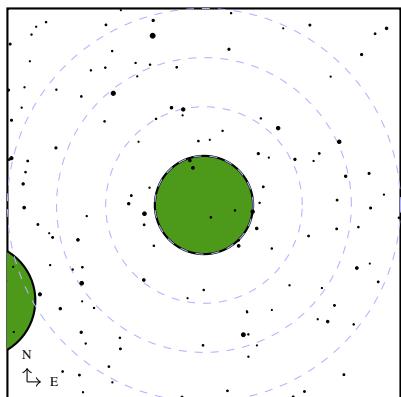
C32 = NGC 4631



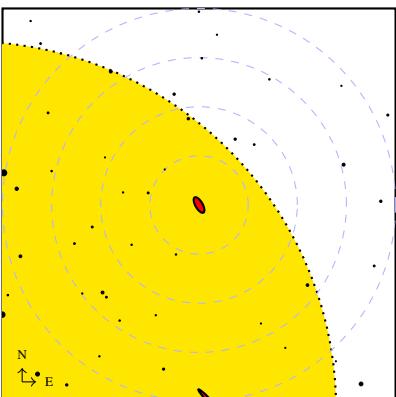
C35 = NGC 4889



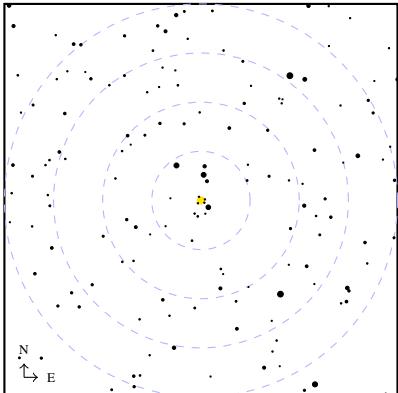
C33 = NGC 6993/6995



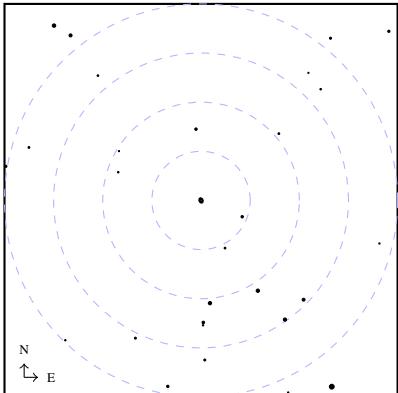
C36 = NGC 4559



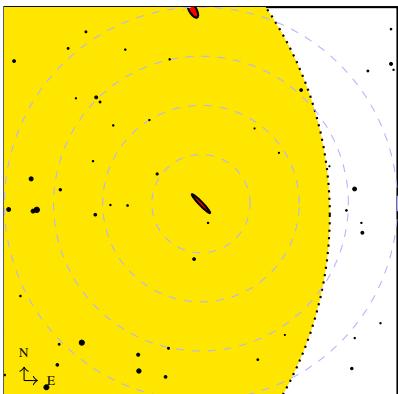
C37 = NGC 6885



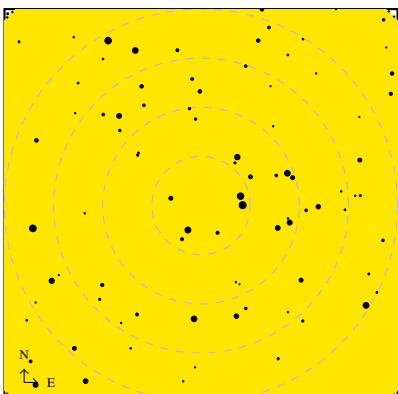
C40 = NGC 3626



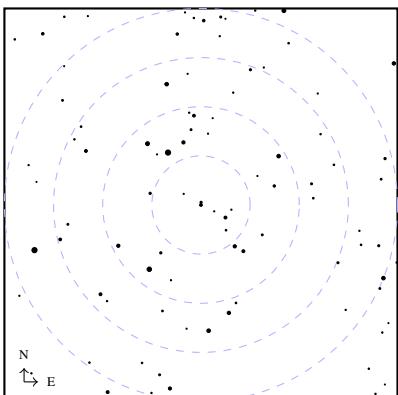
C38 = NGC 4565



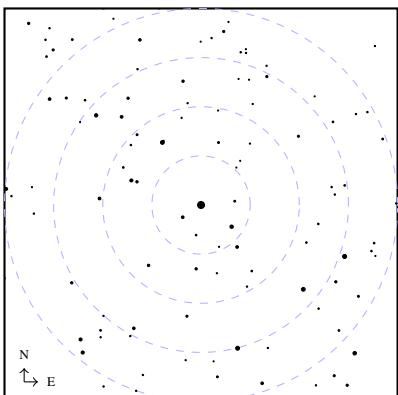
C41 = Hyades



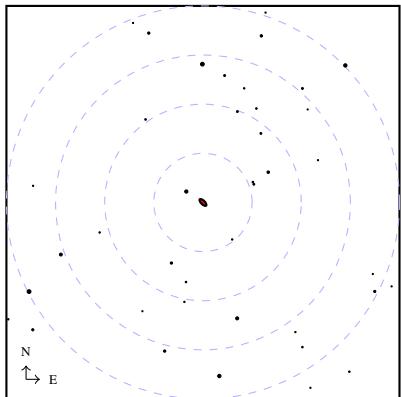
C39 = NGC 2392



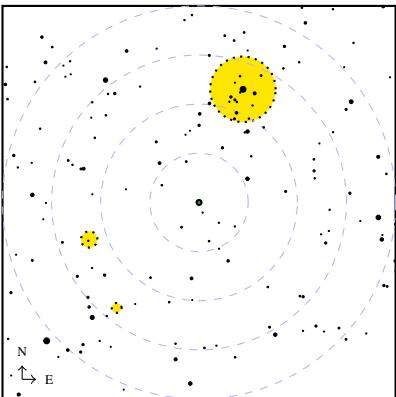
C42 = NGC 7006



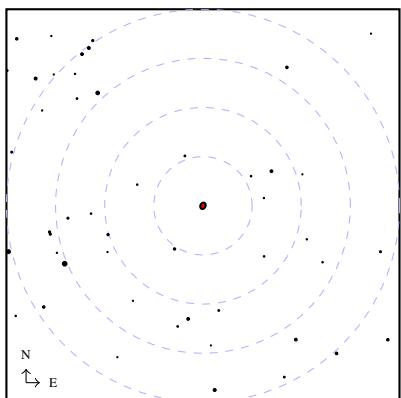
C43 = NGC 7814



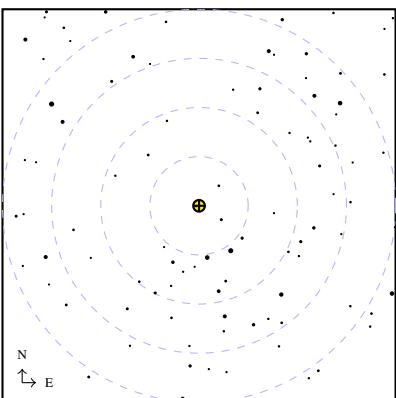
C46 = NGC 2261



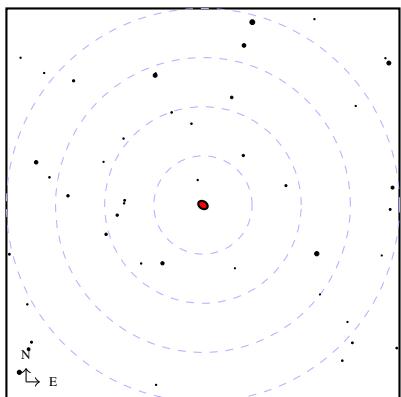
C44 = NGC 7479



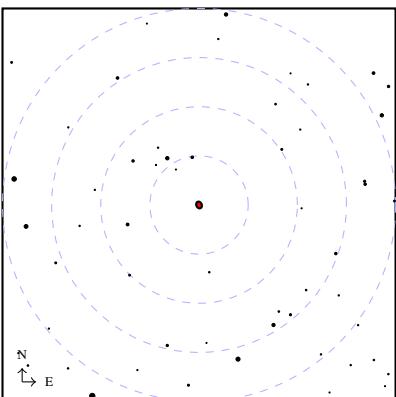
C47 = NGC 6934



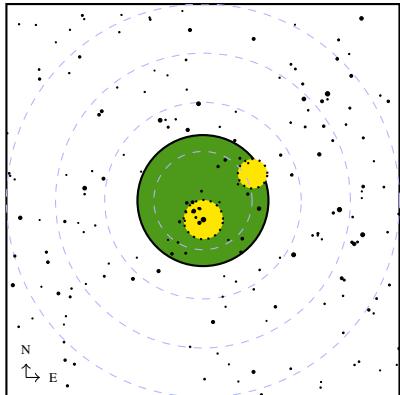
C45 = NGC 5248



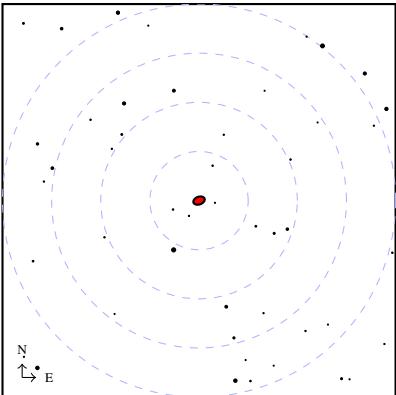
C48 = NGC 2775



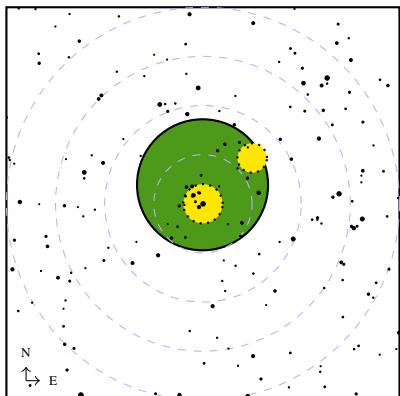
C49 = NGC 2237



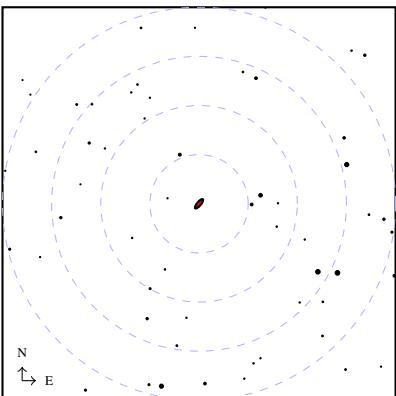
C52 = NGC 4697



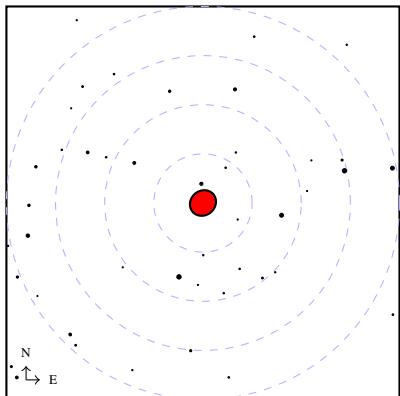
C50 = NGC 2244



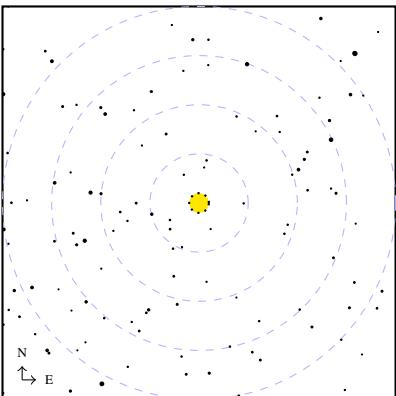
C53 = NGC 3115



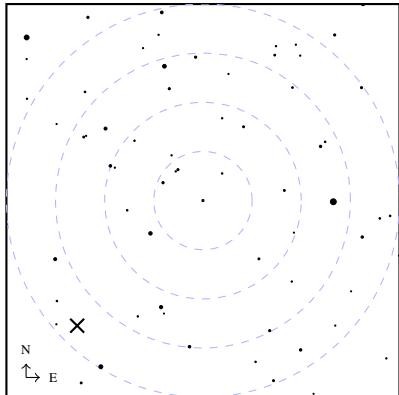
C51 = IC 1613



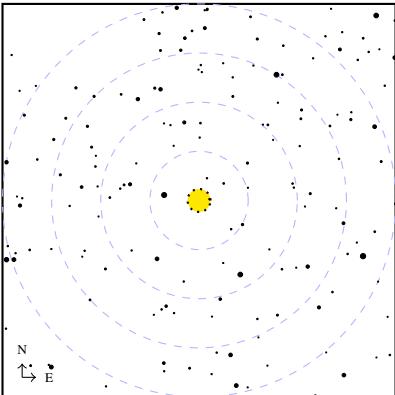
C54 = NGC 2506



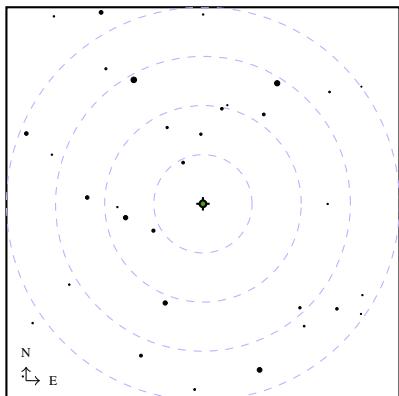
C55 = NGC 7009



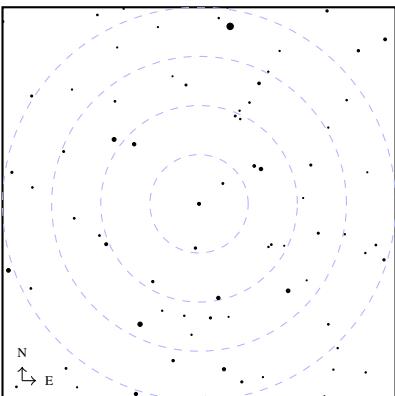
C58 = NGC 2360



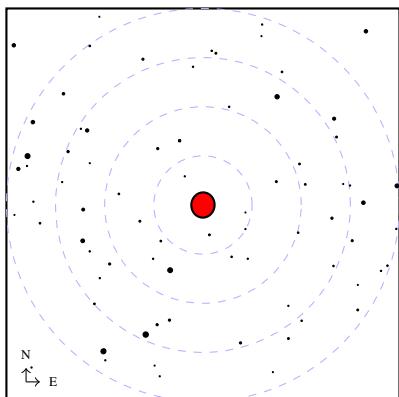
C56 = NGC 246



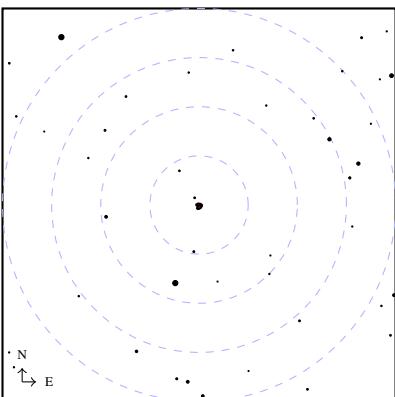
C59 = NGC 3242



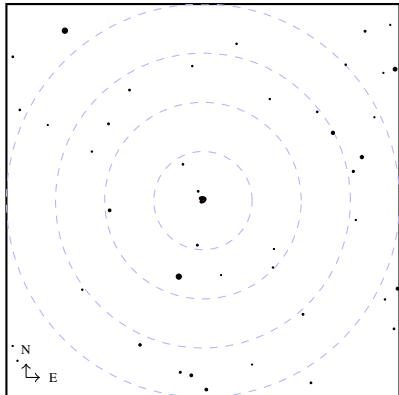
C57 = NGC 6822



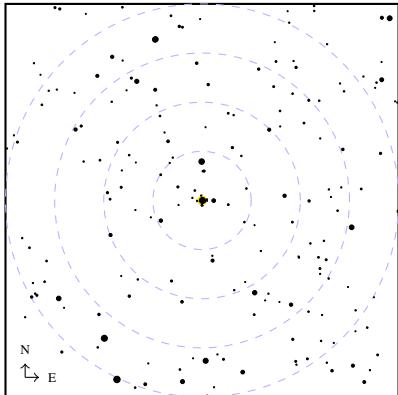
C60 = NGC 4038



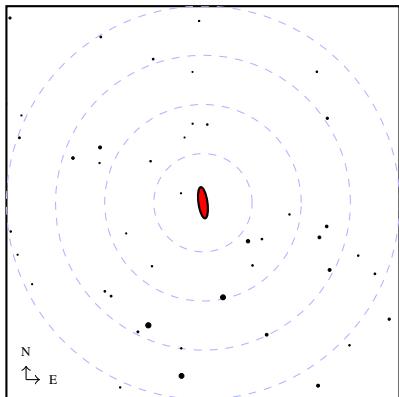
C61 = NGC 4039



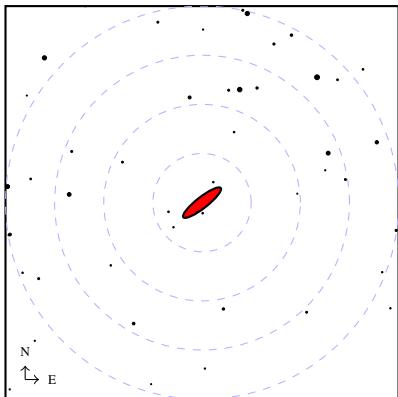
C64 = NGC 2362



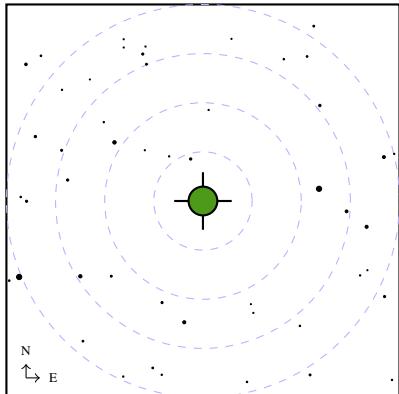
C62 = NGC 247



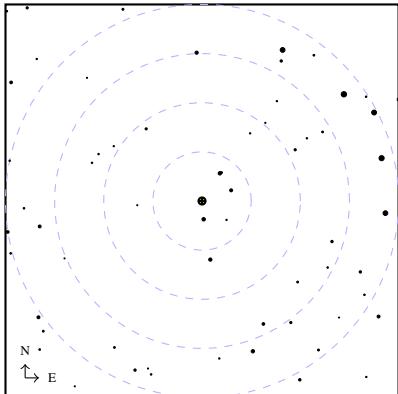
C65 = NGC 253



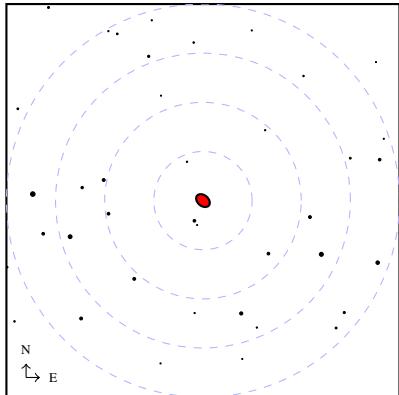
C63 = NGC 7293



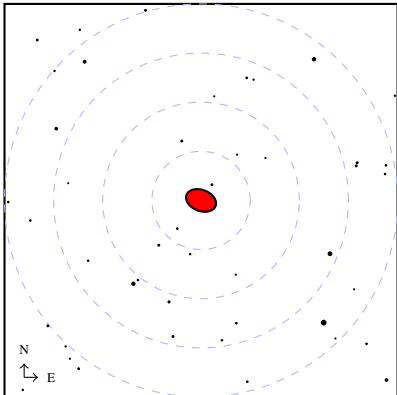
C66 = NGC 5694



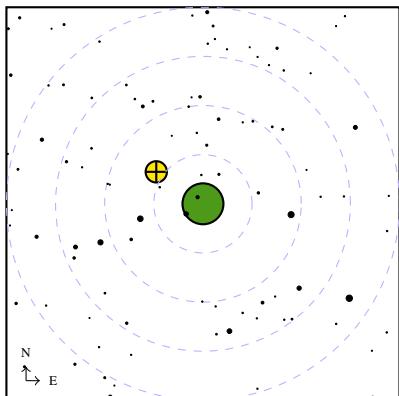
C67 = NGC 1097



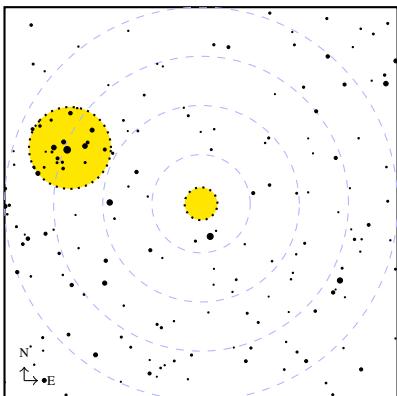
C70 = NGC 300



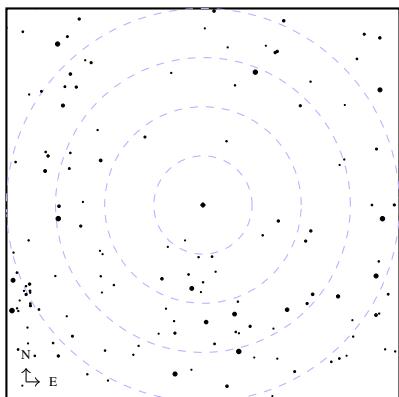
C68 = NGC 6729



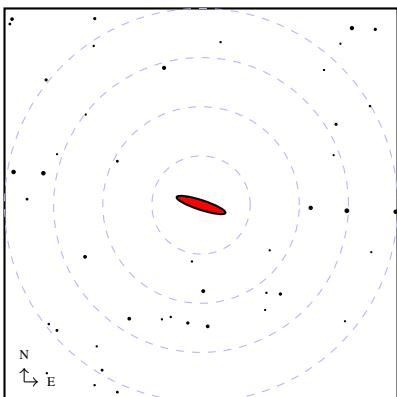
C71 = NGC 2477



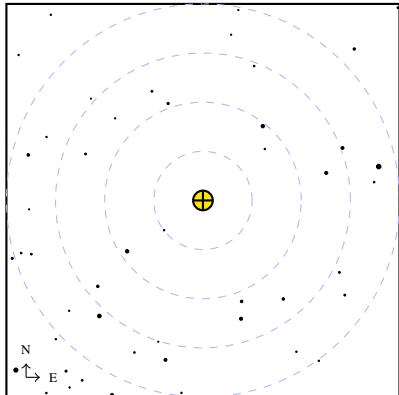
C69 = NGC 6302



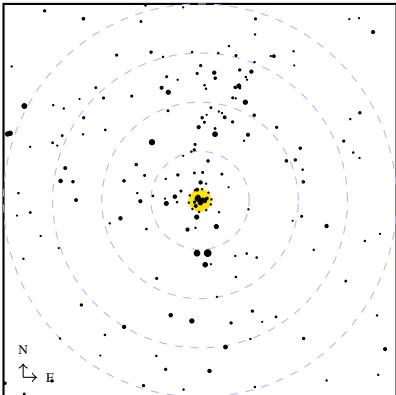
C72 = NGC 55



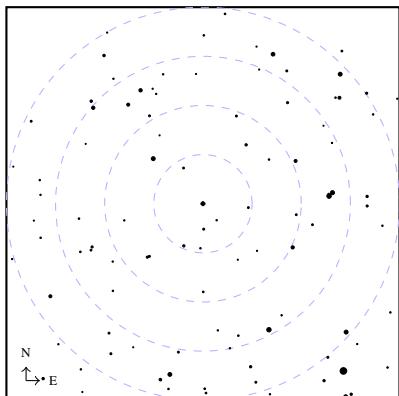
C73 = NGC 1851



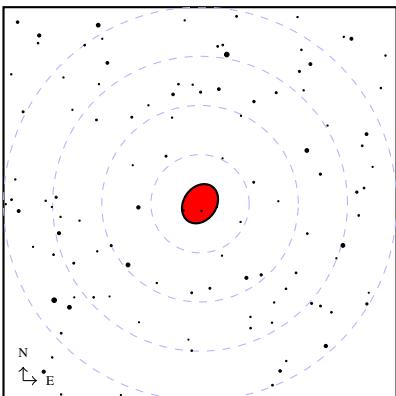
C76 = NGC 6231



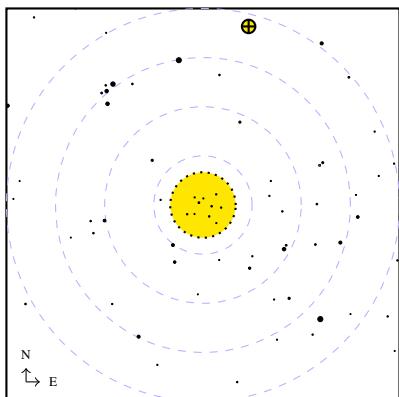
C74 = NGC 3132



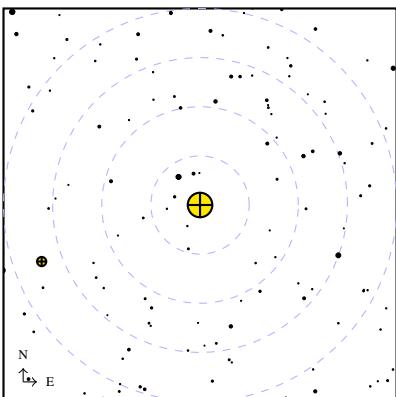
C77 = NGC 5128



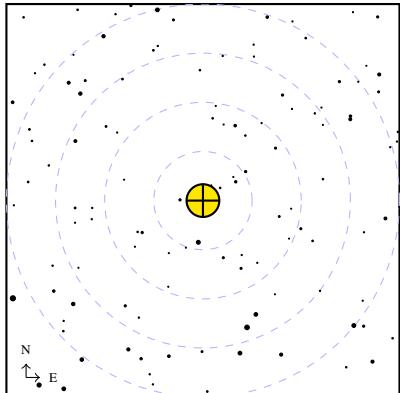
C75 = NGC 6124



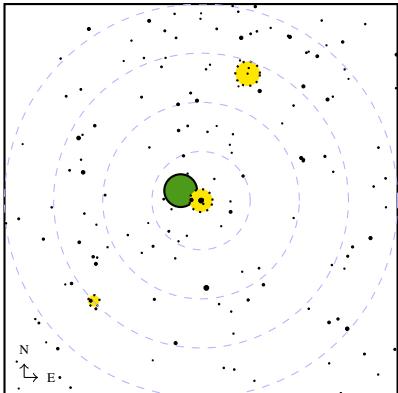
C78 = NGC 6541



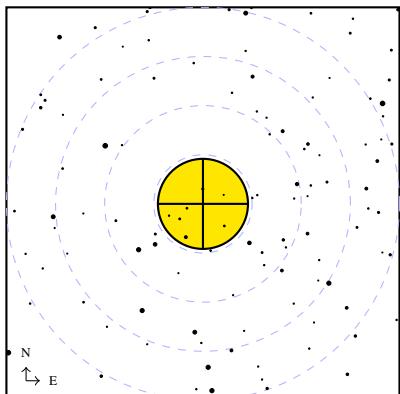
C79 = NGC 3201



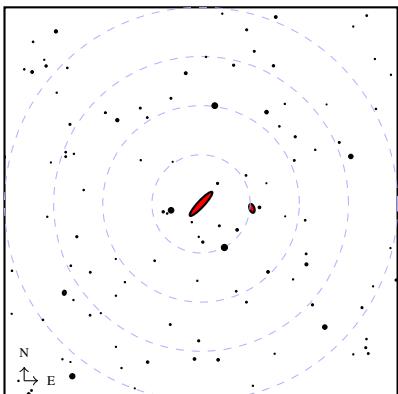
C82 = NGC 6193



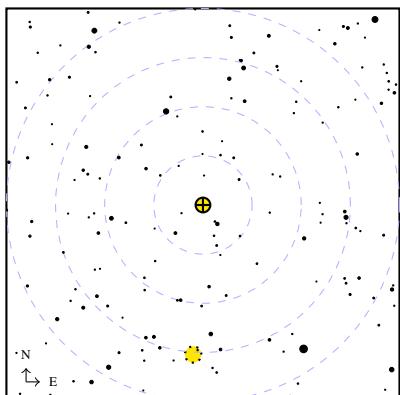
C80 = NGC 5139



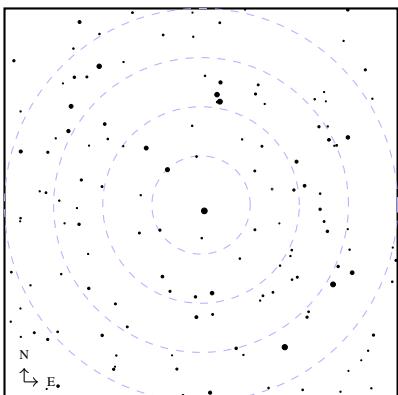
C83 = NGC 4945



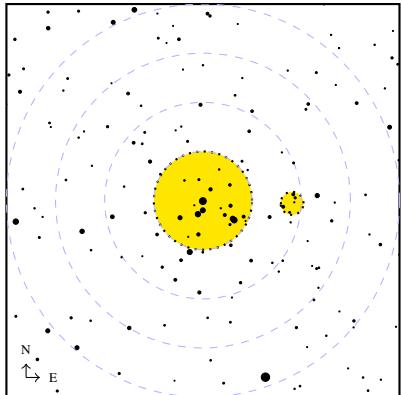
C81 = NGC 6352



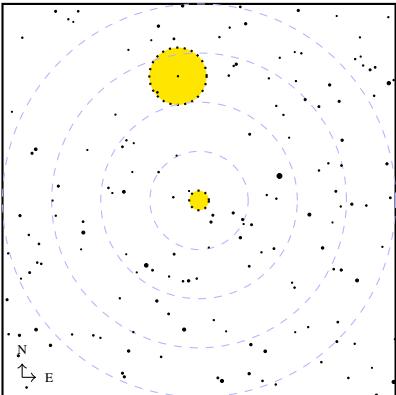
C84 = NGC 5286



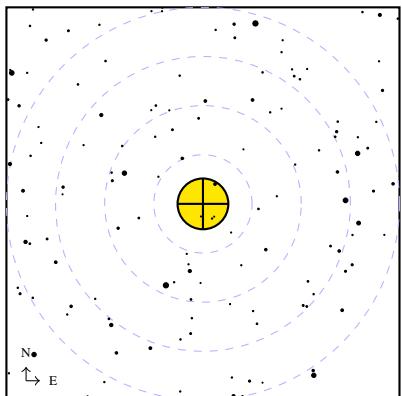
C85 = IC 2391



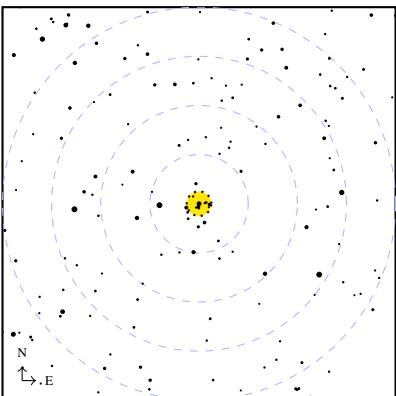
C88 = NGC 5823



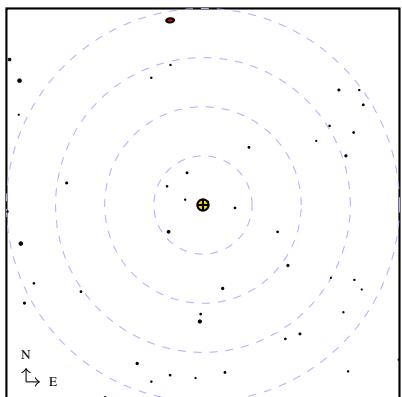
C86 = NGC 6397



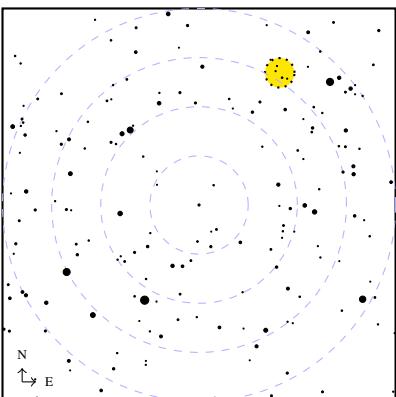
C89 = NGC 6087



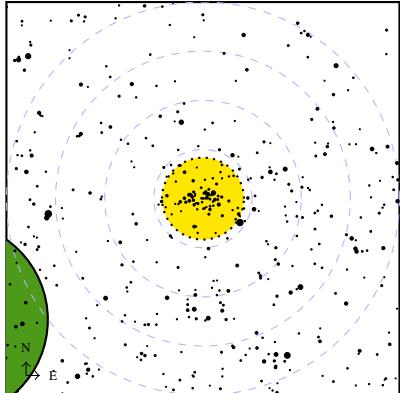
C87 = NGC 1261



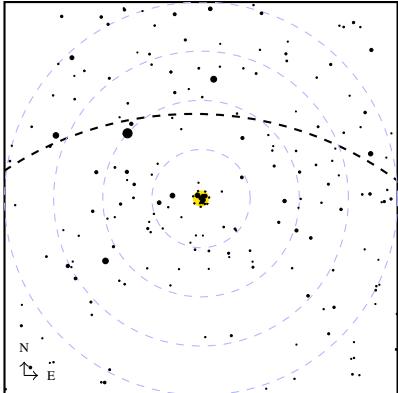
C90 = NGC 2867



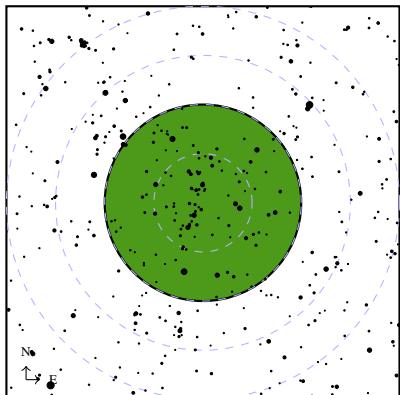
C91 = NGC 3532



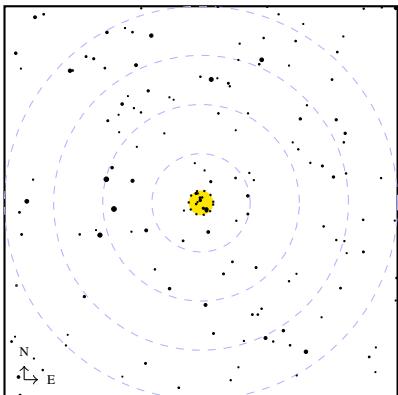
C94 = NGC 4755



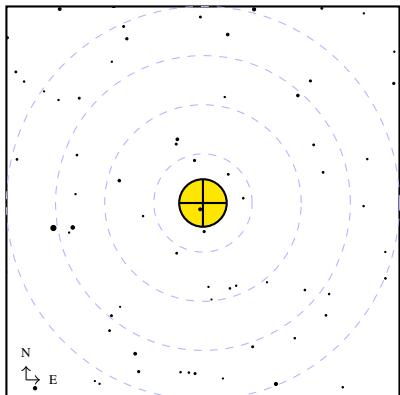
C92 = NGC 3372



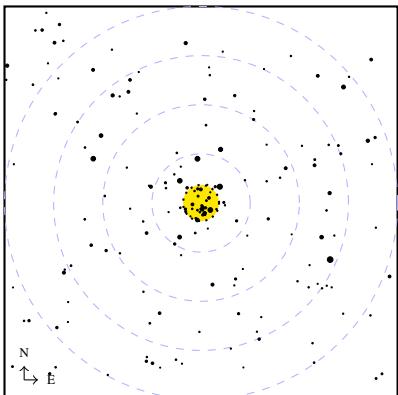
C95 = NGC 6025



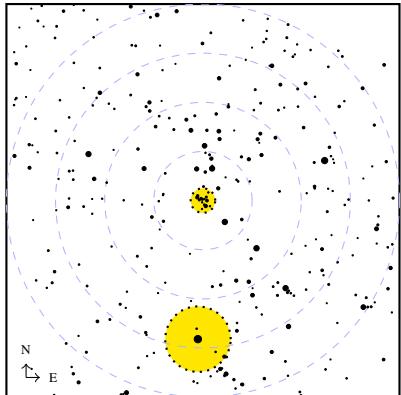
C93 = NGC 6752



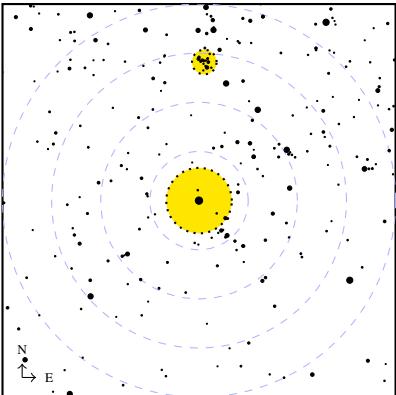
C96 = NGC 2516



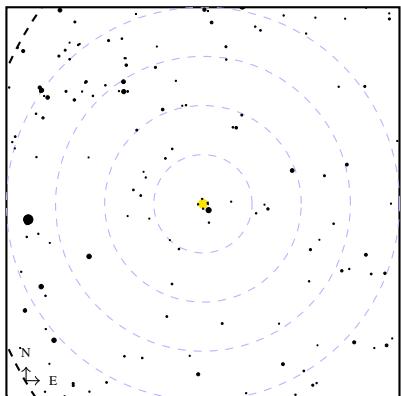
C97 = NGC 3766



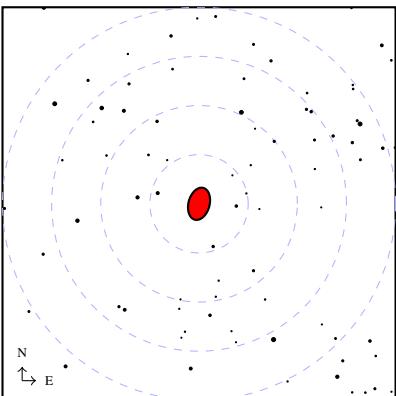
C100 = IC 2944



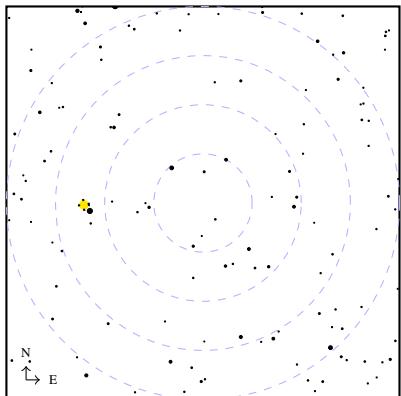
C98 = NGC 4609



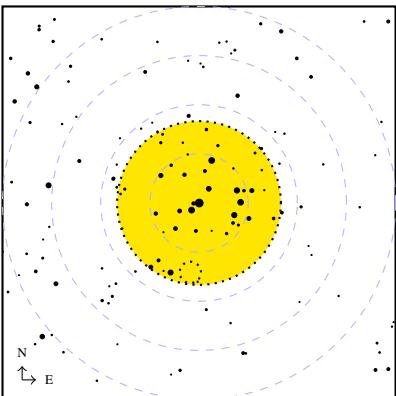
C101 = NGC 6744



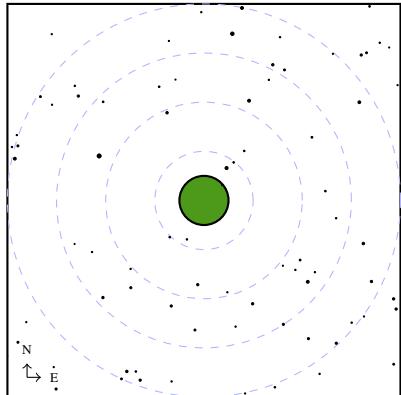
C99 = Coalsack Nebula



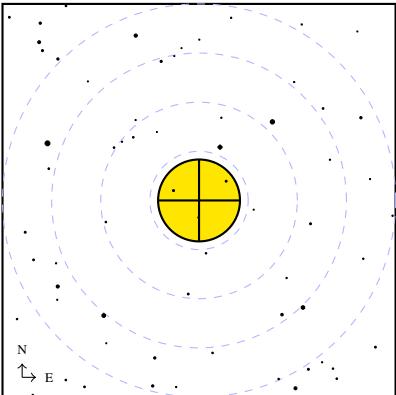
C102 = IC 2602



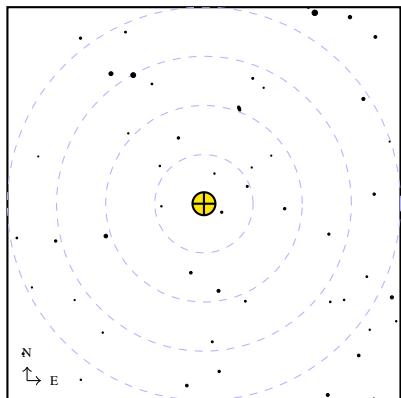
C103 = NGC 2070



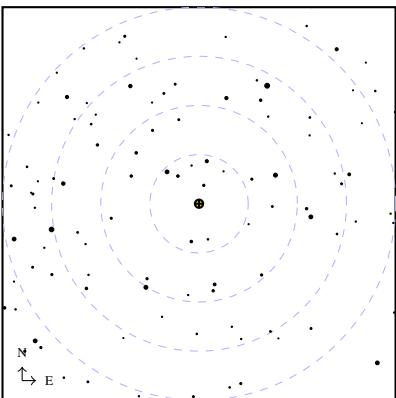
C106 = NGC 104



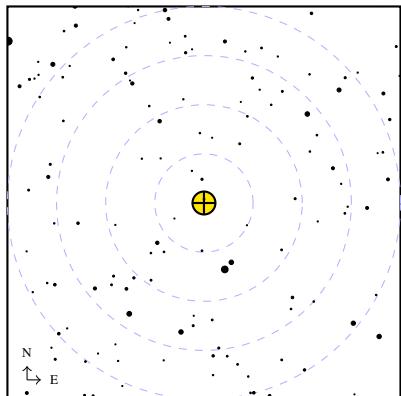
C104 = NGC 362



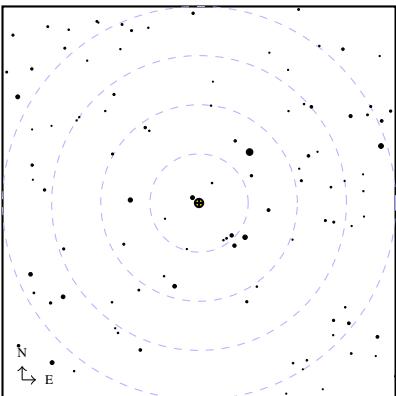
C107 = NGC 6101



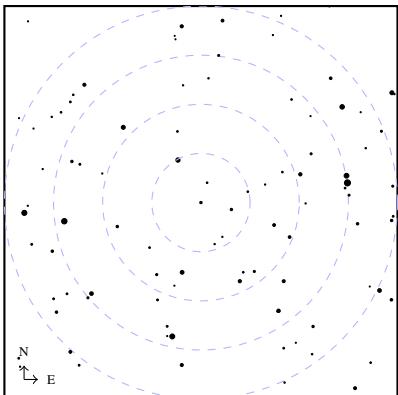
C105 = NGC 4833



C108 = NGC 4372



C109 = NGC 3195



Chapter 3

Urban Observing Program

The Astronomical League Urban Observing Program consists of bright objects selected by Terry Trees for northern observers under light-polluted skies.

The program consists of 100 objects: 87 deep-sky objects, 12 double stars, and 1 variable star. The deep-sky objects range in declination from -35 to $+72$ degrees, cover all seasons, and include 41 Messier objects and 14 Caldwell objects.

For my convenience, I have labelled the deep-sky objects “U1” to “U87” following the order in right ascension given by Trees, but this is not a standard designation.

The following table lists the deep-sky objects with their J2000 positions (hours and minutes of right ascension and decimal degrees of declination), the charts on which they appear in the *Pocket Sky Atlas*, their type, and any other names.

I give finder charts for the deep-sky objects only; the stars are all no fainter than magnitude 5.2 and have Bayer designations, and so a standard all-sky atlas is adequate. For completeness, I include all of the deep-sky objects, even bright ones like the Hyades (U18).

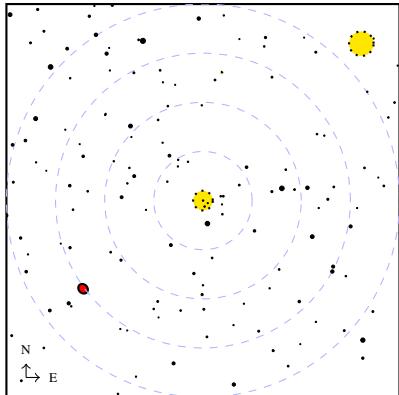
Note that the Hyades (U18) and Coma Star Cluster (U44) are much bigger than the finder charts. They are really binocular objects and better located using a small-scale all-sky atlas. Also note that the α Persei Cluster (U15) and Coma Star Cluster (U44) are not labelled in the *Pocket Sky Atlas*.

For information on the 55 Messier and Caldwell objects, I would refer you to O’Meara’s *Deep-Sky Companions* books. His *Messier Objects* volume also covers U72 (p. 395) and his *Caldwell Objects* volume also covers U19 (p. 509) and U87 (p. 503). For the remaining objects, you might start at Wikipedia.

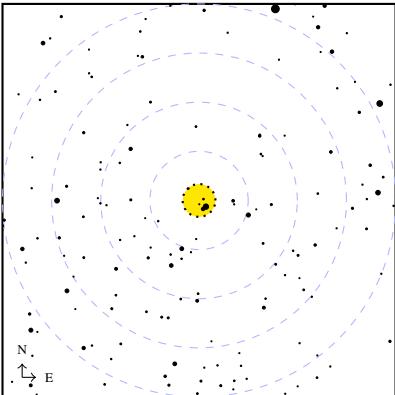
Name	Position	PSA	Type	Other Names
U1	00 30 +60.2	1/3/72	OC	NGC 129
U2	00 43 +40.9	3/72	Gal	M32 / NGC 221
U3	00 43 +41.3	3/72	Gal	M31 / NGC 224 / Andromeda Galaxy
U4	01 20 +58.3	1/3/72	OC	C13 / NGC 457 / Owl Cluster
U5	01 46 +61.2	1/2	OC	C10 / NGC 663
U6	01 48 +72.0	1/11	OC	Cr 463
U7	01 58 +37.8	2	OC	C28 / NGC 752
U8	02 15 +59.3	1/2/13	OC	Stock 2
U9	02 19 +57.1	1/2/13	OC	C14 / NGC 869 / h Persei / Double Cluster
U10	02 22 +57.1	1/2/13	OC	C14 / NGC 884 / χ Persei / Double Cluster
U11	02 37 +56.0	1/2/13	OC	Tr 2
U12	02 43 -00.0	4/6	Gal	M77 / NGC 1068 / Squid Galaxy
U13	03 12 +63.3	1/2/11/13	OC	Tr 3
U14	03 16 +60.0	2/11/13	OC	Stock 23 / Pazmino's Cluster
U15	03 27 +48.8	2/13	OC	Mel 20 / Cr 15 / α Persei Cluster
U16	03 32 +37.4	2/13	OC	NGC 1342
U17	03 47 +24.1	13/15/A	OC	M45 / Mel 22 / Cr 42 / Pleiades
U18	04 27 +15.9	15	OC	C41 / Mel 25 / Cr 50 / Hyades
U19	04 46 +19.1	14/15	OC	NGC 1647
U20	05 11 +16.5	14	OC	NGC 1807
U21	05 12 +16.7	14	OC	NGC 1817
U22	05 29 +35.9	12/14	OC	M38 / NGC 1912 / Starfish Cluster
U23	05 36 +34.1	12/14	OC	M36 / NGC 1960
U24	05 35 -05.4	16/B	BN	M42 / NGC 1976 / Orion Nebula
U25	05 35 -04.4	16/B	OC	NGC 1981
U26	05 52 +32.6	12/14/23/25	OC	M37 / NGC 2099
U27	06 09 +24.4	12/14/23/25	OC	M35 / NGC 2168
U28	06 08 +14.0	14/25	OC	NGC 2169
U29	06 27 -04.8	25/27	OC	NGC 2232
U30	06 32 +04.9	25/E	OC	C50 / NGC 2244 / Satellite Cluster
U31	06 41 +09.9	25/E	OC	NGC 2264 / Christmas Tree Cluster
U32	06 48 +41.1	12/23	OC	NGC 2281
U33	06 46 -20.8	27	OC	M41 / NGC 2287 / Little Beehive Cluster
U34	06 52 +00.5	25/27	OC	NGC 2301
U35	07 03 -08.4	27	OC	M50 / NGC 2323
U36	07 29 +20.9	25	PN	C39 / NGC 2392 / Eskimo Nebula
U37	08 11 -12.8	26	OC	NGC 2539
U38	08 14 -05.8	26	OC	M48 / NGC 2548
U39	08 40 +19.7	24/35	OC	M44 / NGC 2632 / Beehive Cluster
U40	08 51 +11.8	24/35	OC	M67 / NGC 2682
U41	09 56 +69.1	21/31	Gal	M81 / NGC 3031 / Bode's Galaxy
U42	09 56 +69.7	21/31	Gal	M82 / NGC 3034 / Cigar Galaxy
U43	10 25 -18.6	36/37	PN	C59 / NGC 3242 / Ghost of Jupiter
U44	12 26 +25.9	45	OC	Mel 111 / Cr 256 / Coma Star Cluster
U45	12 25 +12.9	45/C	Gal	M84 / NGC 4374
U46	12 26 +12.9	45/C	Gal	M86 / NGC 4406
U47	12 31 +12.4	45/C	Gal	M87 / NGC 4486
U48	12 40 -11.6	47	Gal	M104 / NGC 4594 / Sombrero Galaxy
U49	12 51 +41.1	32/43	Gal	M94 / NGC 4736

Name	Position	PSA	Type	Other Names
U50	12 57 +21.7	45	Gal	M64 / NGC 4826 / Black-Eye Galaxy
U51	13 42 +28.4	43/44	GC	M3 / NGC 5272
U52	15 19 +02.1	55/57	GC	M5 / NGC 5904
U53	16 24 -26.5	56/58	GC	M4 / NGC 6121
U54	16 42 +36.5	52	GC	M13 / NGC 6205 / Hercules Globular Cluster
U55	16 44 +23.8	52/54	PN	NGC 6210
U56	16 47 -01.9	54/56	GC	M12 / NGC 6218
U57	16 57 -04.1	54/56	GC	M10 / NGC 6254
U58	17 01 -30.1	56/58	GC	M62 / NGC 6266
U59	17 17 +43.1	52/63	GC	M92 / NGC 6341
U60	17 40 -32.3	56/58/66/68/J	OC	M6 / NGC 6405 / Butterfly Cluster
U61	17 46 +05.7	54/65	OC	IC 4665
U62	17 54 -34.8	58/67/69/J	OC	M7 / NGC 6475
U63	18 03 -27.9	67/69/I	OC	NGC 6520
U64	18 04 -24.4	67/69/I	BN	M8 / NGC 6523 / Lagoon Nebula
U65	18 21 -16.2	67/I	BN	M17 / NGC 6618 / Omega Nebula
U66	18 27 +06.5	65	OC	NGC 6633 / Tweedledum Cluster
U67	18 36 -23.9	67/69/I	GC	M22 / NGC 6656
U68	18 39 +05.4	65	OC	IC 4756 / Tweedledee Cluster
U69	18 51 -06.3	65/67	OC	M11 / NGC 6705 / Wild Duck Cluster
U70	18 52 +10.3	65	OC	NGC 6709
U71	18 54 +33.0	63/65	PN	M57 / NGC 6720 / Ring Nebula
U72	19 25 +20.2	64/65	OC	Cr 399 / Brocchi's Cluster / Coathanger Cluster
U73	19 44 -14.2	66	PN	NGC 6818 / Little Gem Nebula
U74	19 45 +50.5	62/73	PN	C15 / NGC 6826 / Blinking Planetary
U75	20 00 +22.7	62/64	PN	M27 / NGC 6853 / Dumbbell Nebula
U76	20 23 +40.8	62/73	OC	NGC 6910
U77	20 34 +07.4	64	GC	C47 / NGC 6934
U78	20 35 +28.3	62/64/73	OC	NGC 6940
U79	21 04 -11.4	77	PN	C55 / NGC 7009 / Saturn Nebula
U80	21 30 +12.2	75	GC	M15 / NGC 7078
U81	21 33 -00.8	75/77	GC	M2 / NGC 7089
U82	21 32 +48.4	62/73	OC	M39 / NGC 7092
U83	21 54 +62.6	71/73	OC	NGC 7160
U84	22 05 +46.5	62/73	OC	NGC 7209
U85	22 15 +49.9	62/73	OC	C16 / NGC 7243
U86	23 26 +42.5	3/72	PN	C22 / NGC 7662 / Blue Snowball Nebula
U87	23 57 +56.7	3/71/72	OC	NGC 7789 / Caroline's Rose

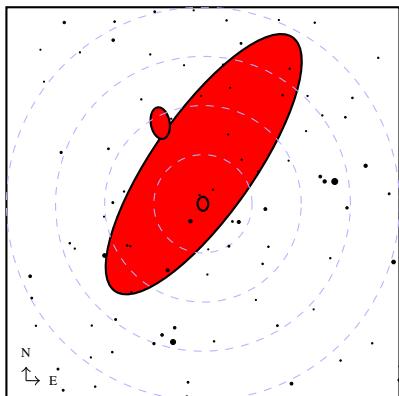
U1 = NGC 129



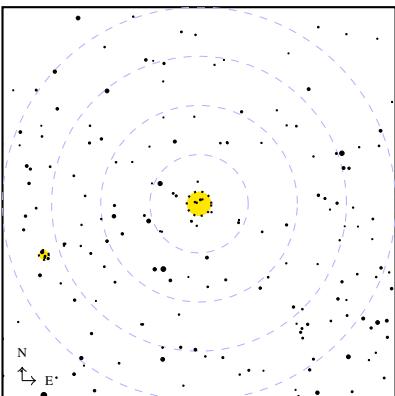
U4 = NGC 457



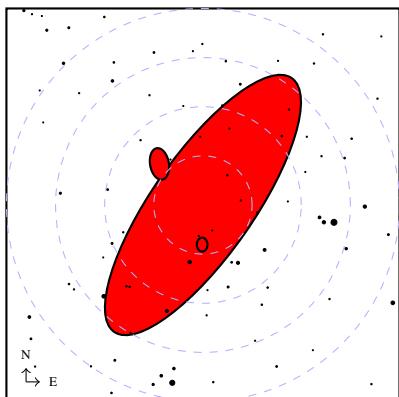
U2 = M32



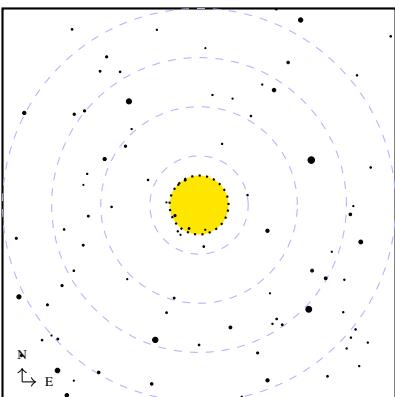
U5 = NGC 663



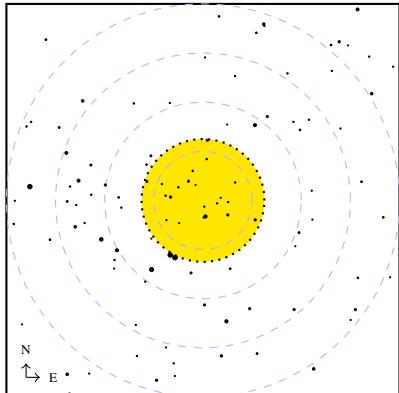
U3 = M31



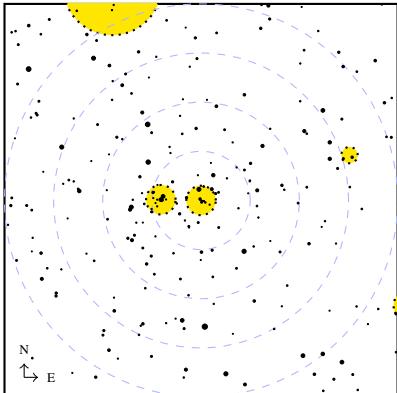
U6 = Cr 463



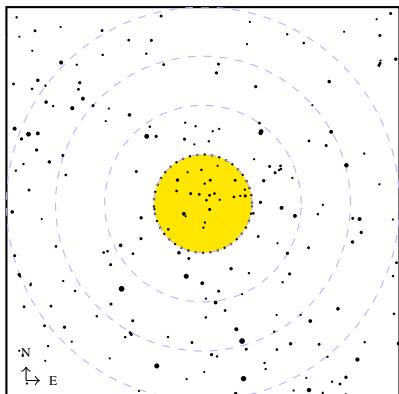
U7 = NGC 752



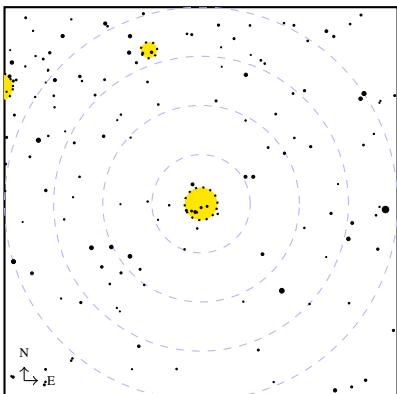
U10 = NGC 884



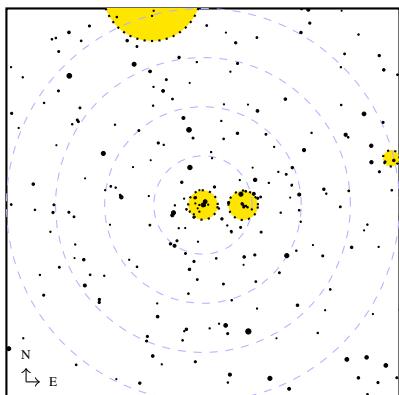
U8 = Stock 2



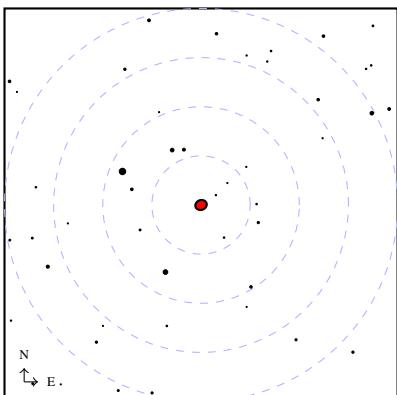
U11 = Tr 2



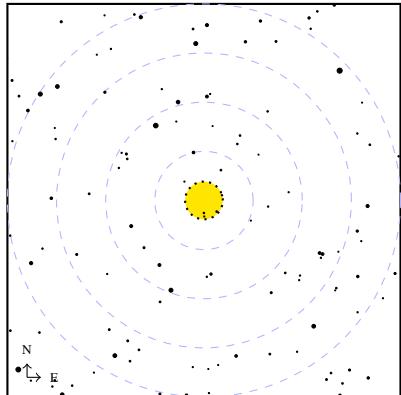
U9 = NGC 869



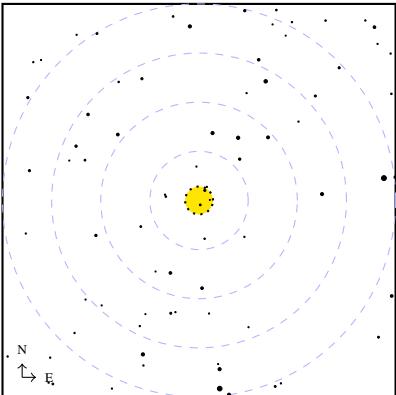
U12 = M77



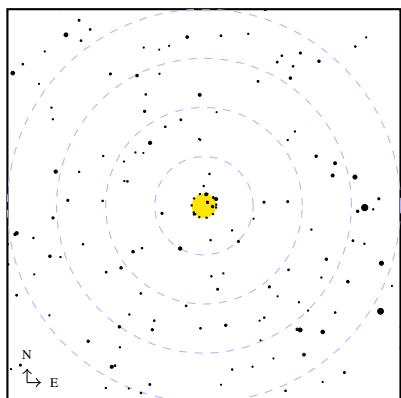
U13 = Tr 3



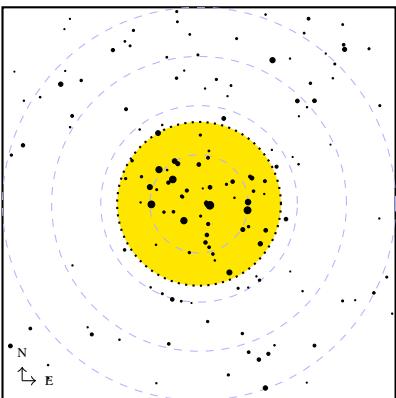
U16 = NGC 1342



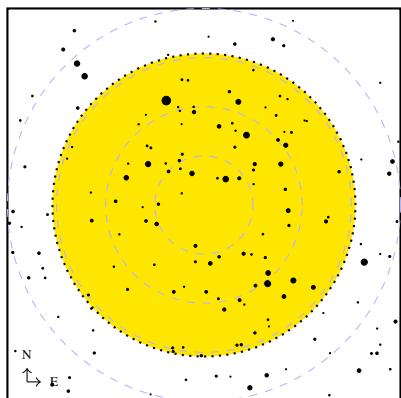
U14 = Stock 23



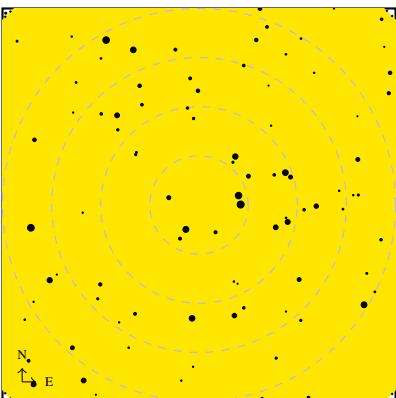
U17 = M45



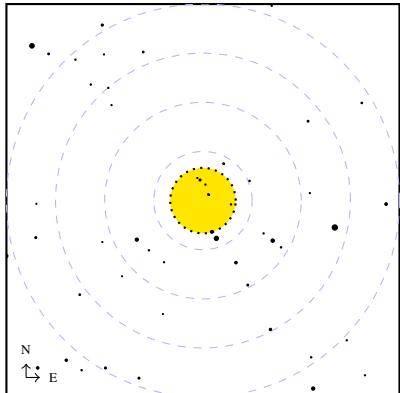
U15 = Mel 20



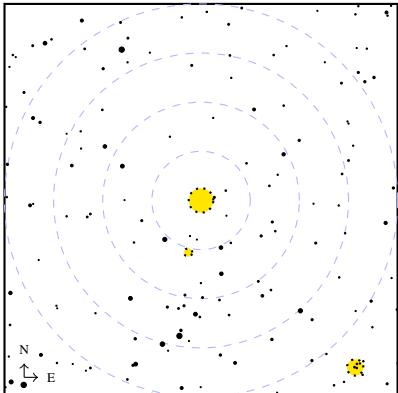
U18 = Hyades



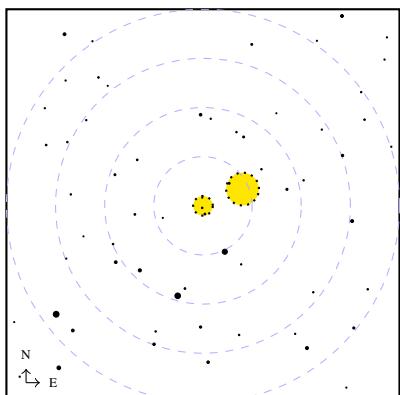
U19 = NGC 1647



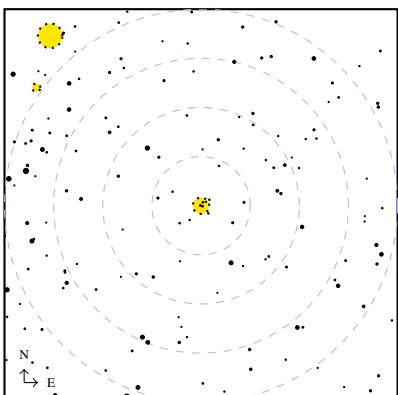
U22 = M38



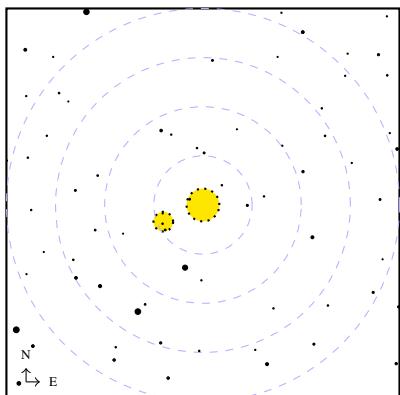
U20 = NGC 1807



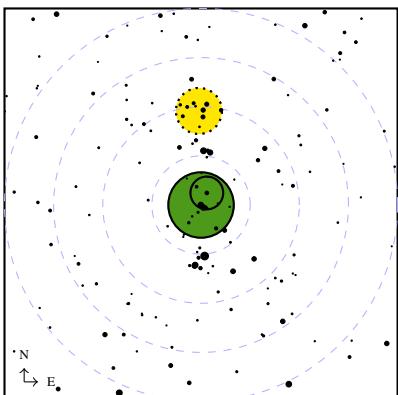
U23 = M36



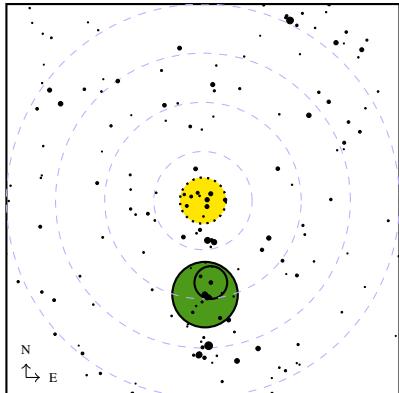
U21 = NGC 1817



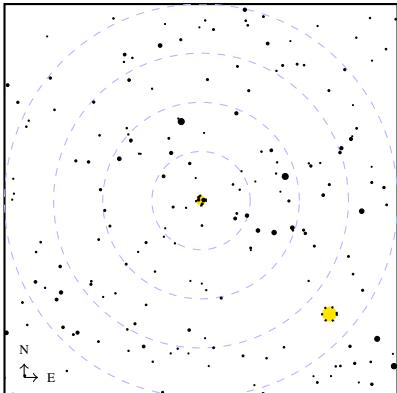
U24 = M42



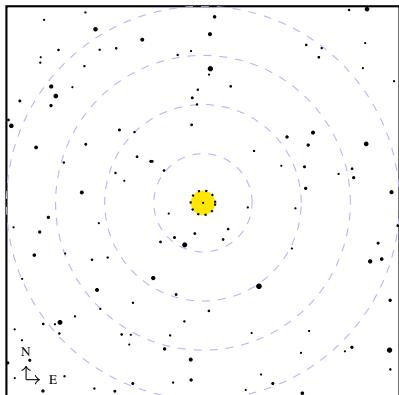
U25 = NGC 1981



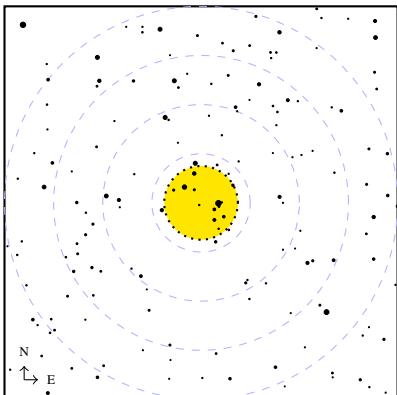
U28 = NGC 2169



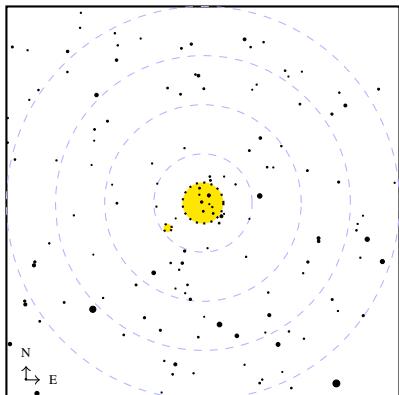
U26 = M37



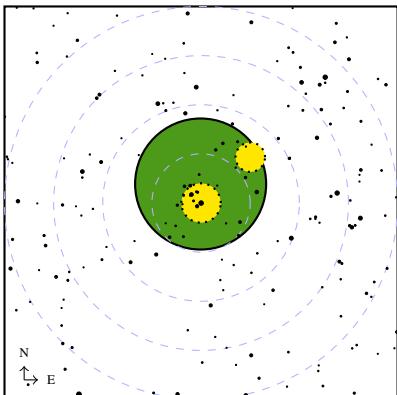
U29 = NGC 2232



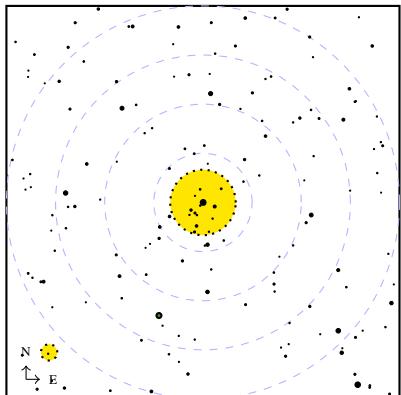
U27 = M35



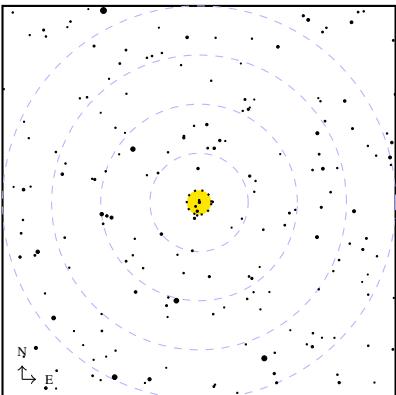
U30 = NGC 2244



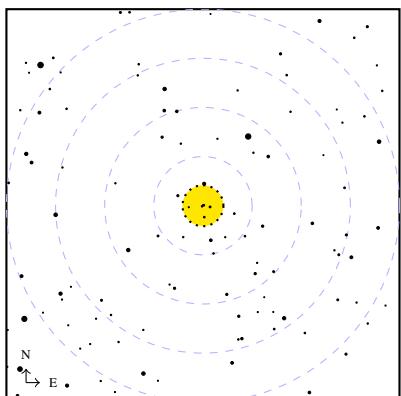
U31 = NGC 2264



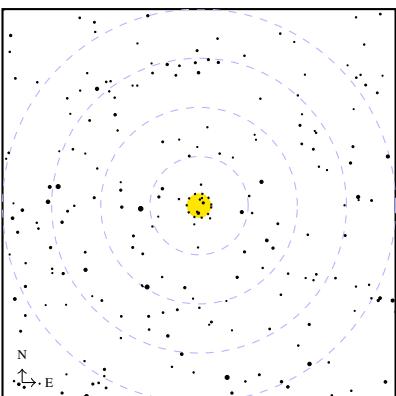
U34 = NGC 2301



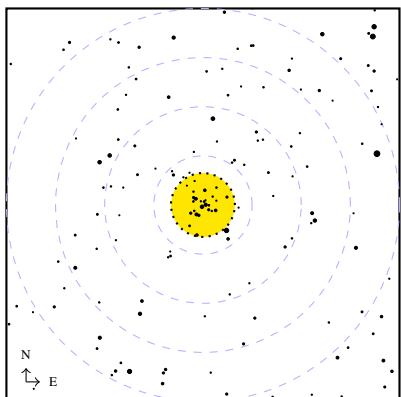
U32 = NGC 2281



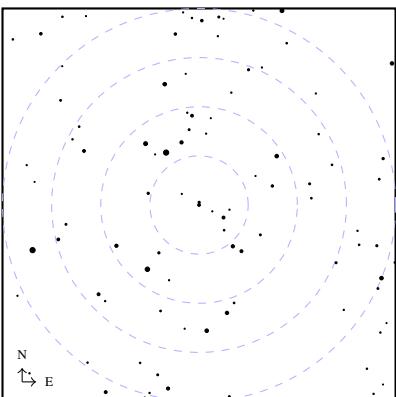
U35 = M50



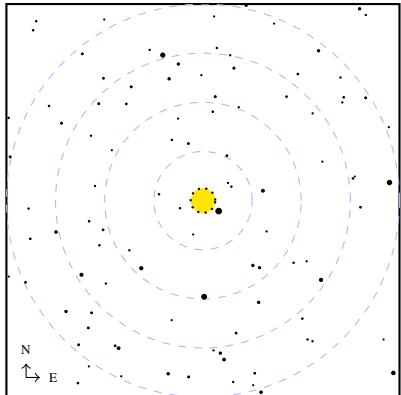
U33 = M41



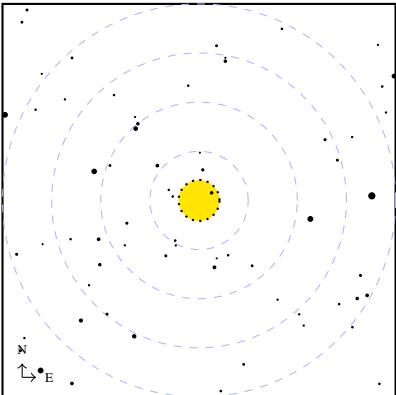
U36 = NGC 2392



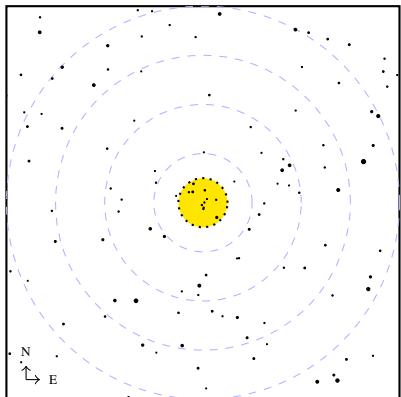
U37 = NGC 2539



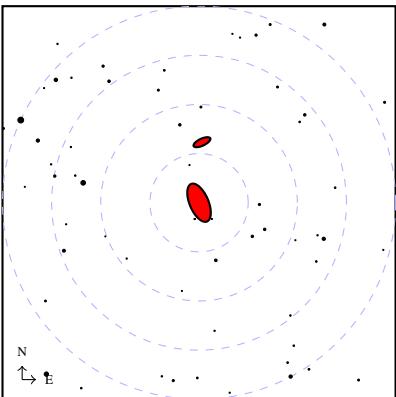
U40 = M67



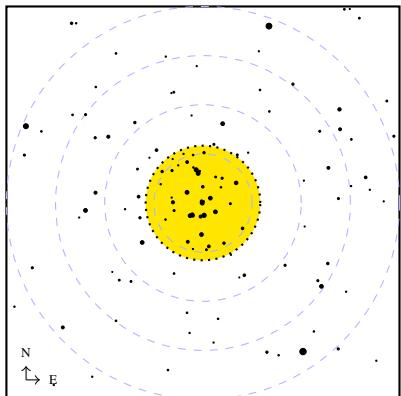
U38 = M48



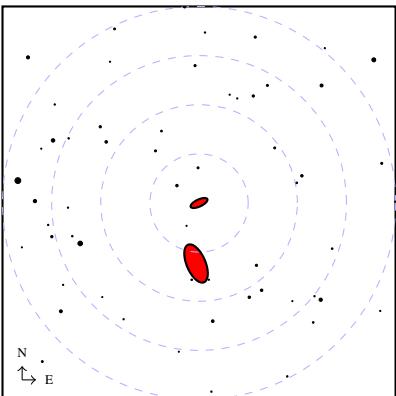
U41 = M81



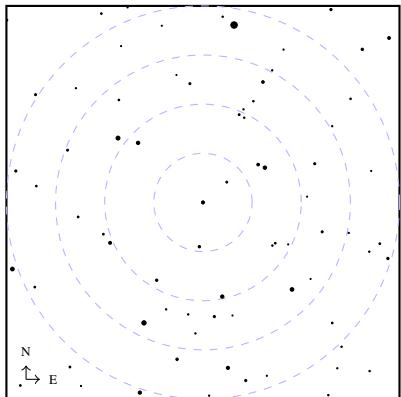
U39 = M44



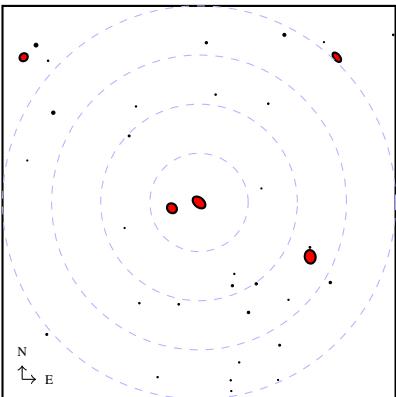
U42 = M82



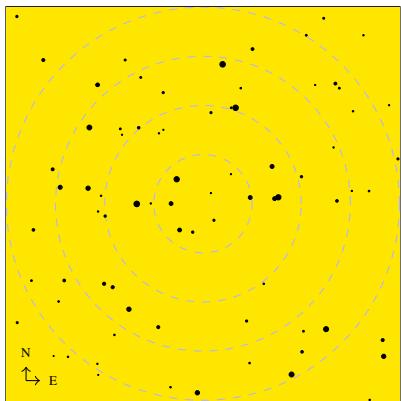
U43 = NGC 3242



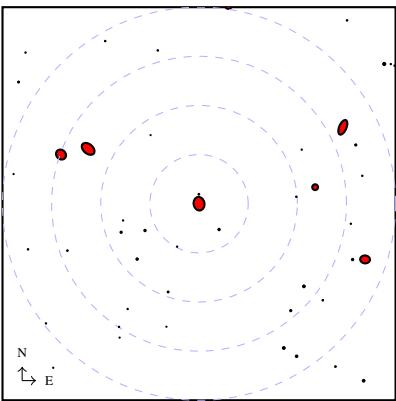
U46 = M86



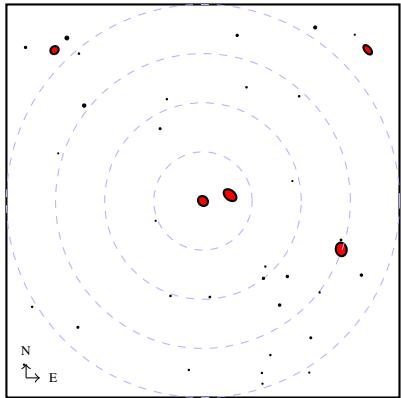
U44 = Mel 111



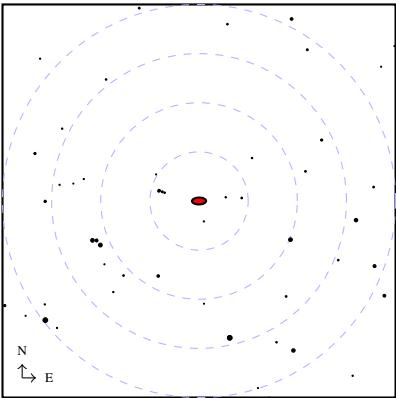
U47 = M87



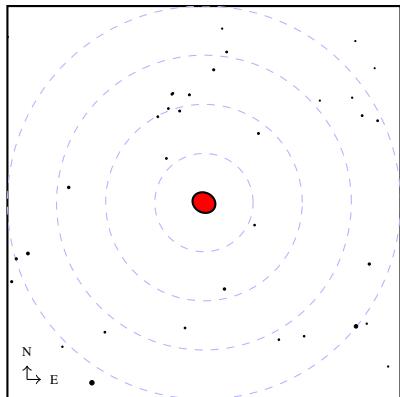
U45 = M84



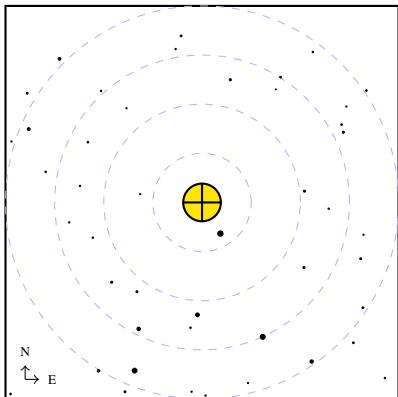
U48 = M104



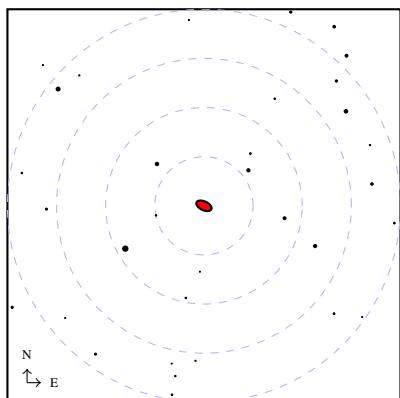
U49 = M94



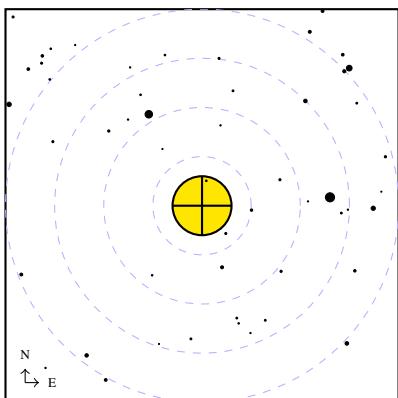
U52 = M5



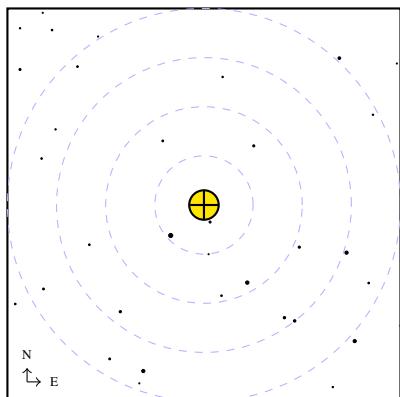
U50 = M64



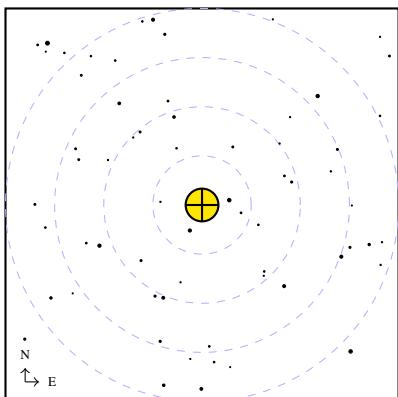
U53 = M4



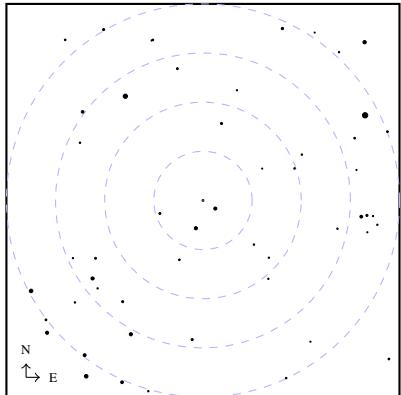
U51 = M3



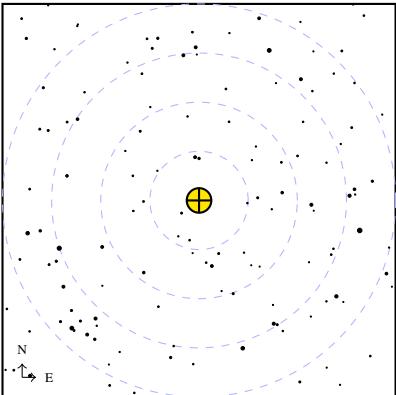
U54 = M13



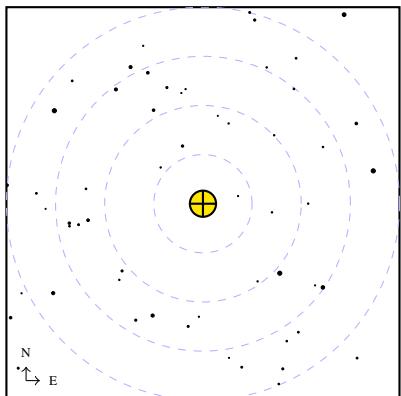
U55 = NGC 6210



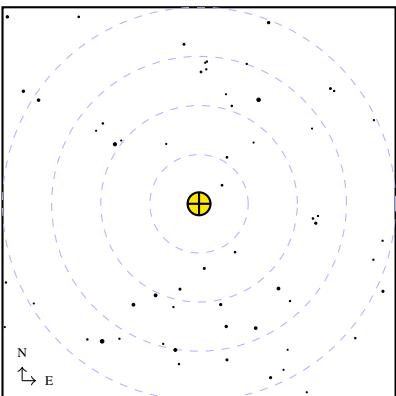
U58 = M62



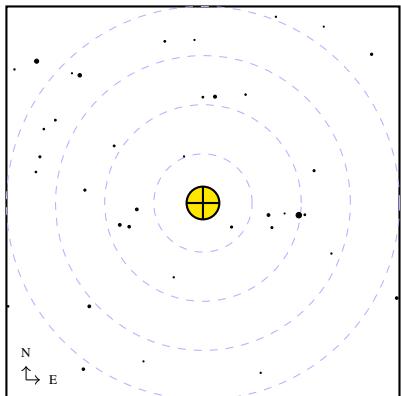
U56 = M12



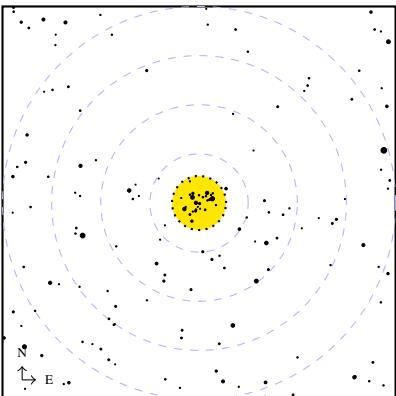
U59 = M92



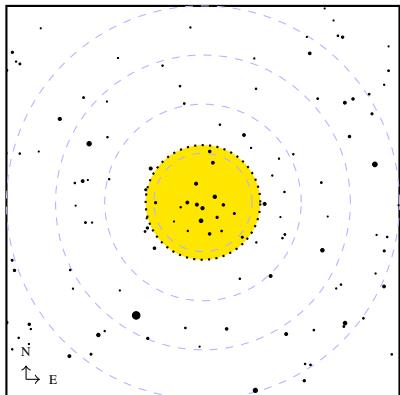
U57 = M10



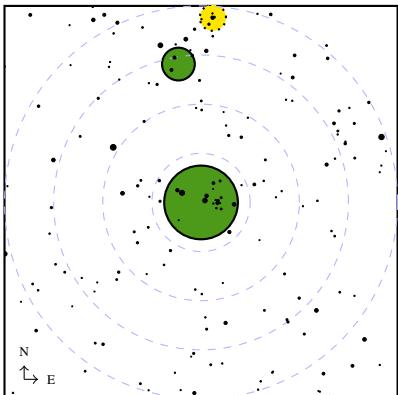
U60 = M6



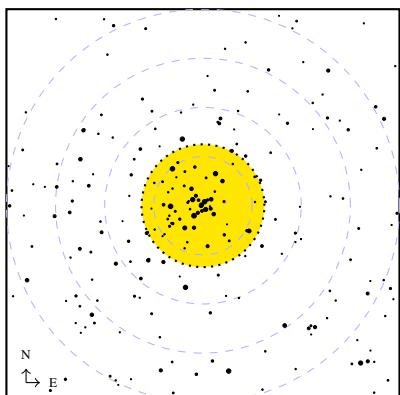
U61 = IC 4665



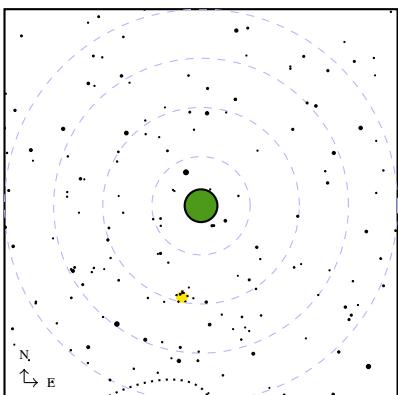
U64 = M8



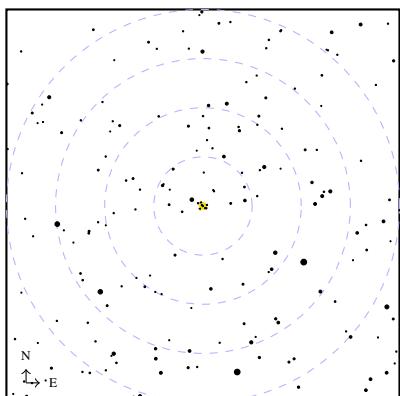
U62 = M7



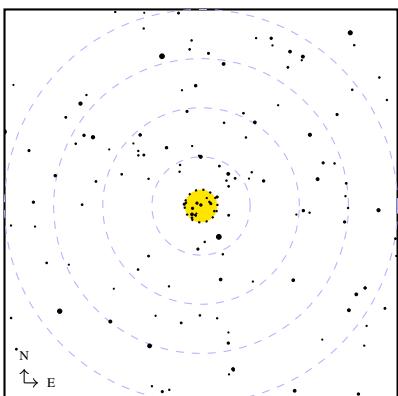
U65 = M17



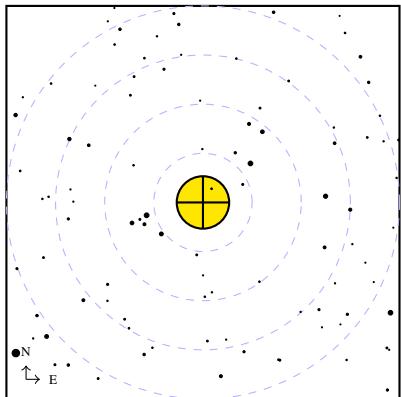
U63 = NGC 6520



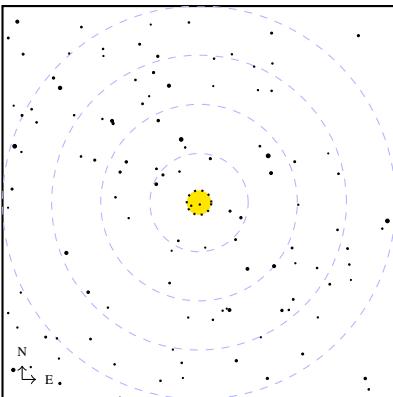
U66 = NGC 6633



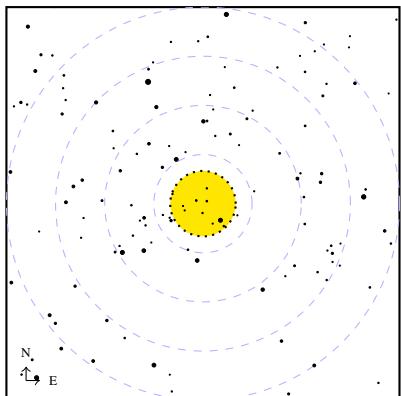
U67 = M22



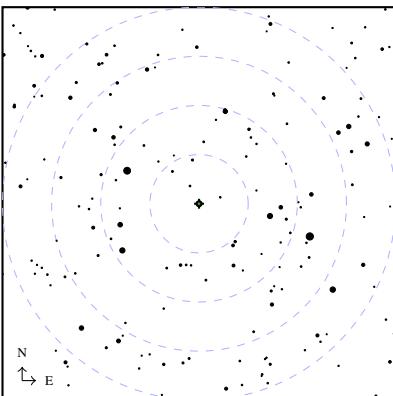
U70 = NGC 6709



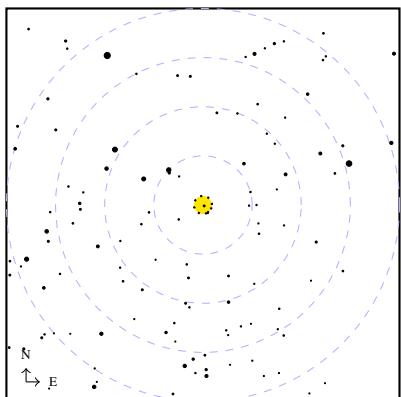
U68 = IC 4756



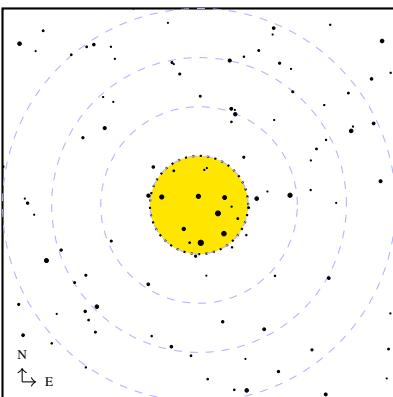
U71 = M57



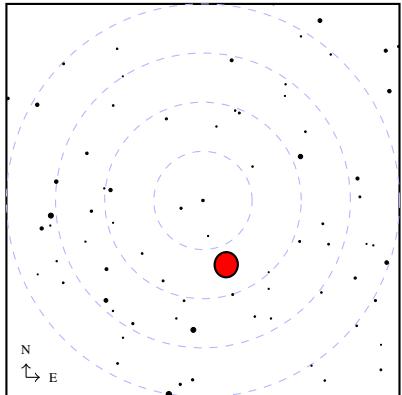
U69 = M11



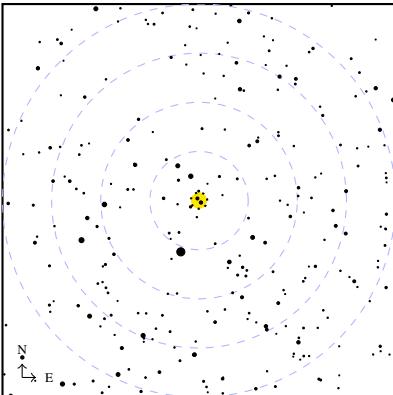
U72 = Cr 399



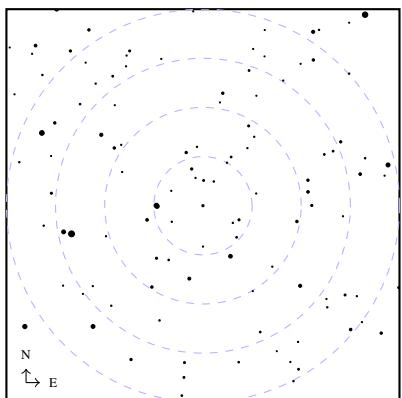
U73 = NGC 6818



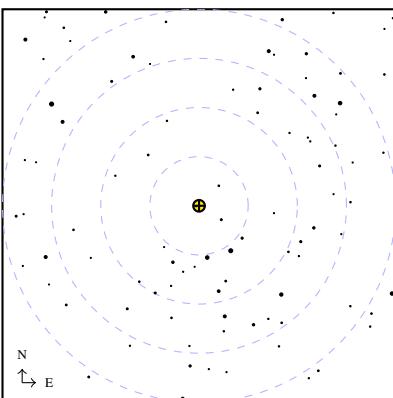
U76 = NGC 6910



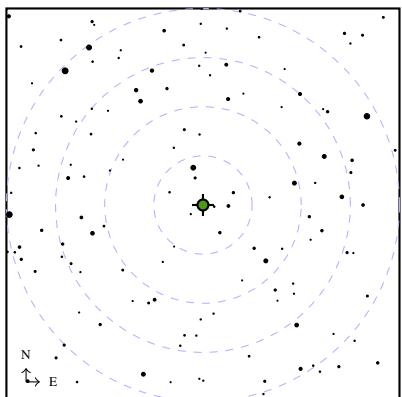
U74 = NGC 6826



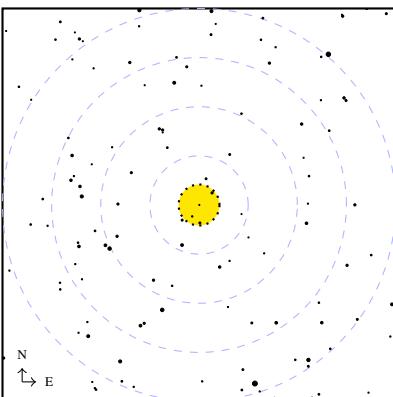
U77 = NGC 6934



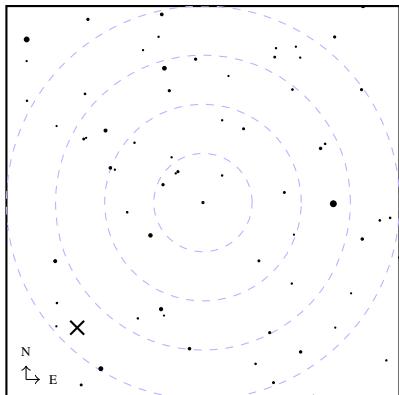
U75 = M27



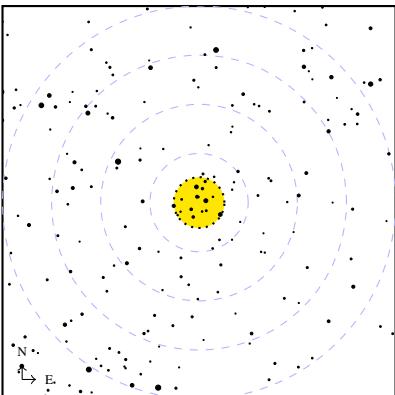
U78 = NGC 6940



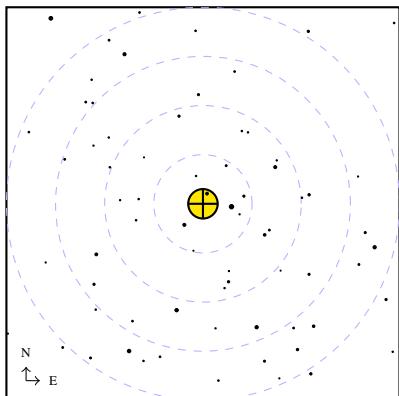
U79 = NGC 7009



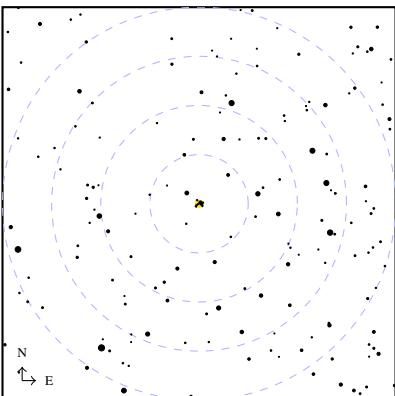
U82 = M39



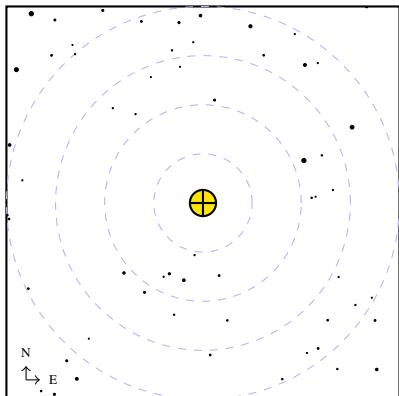
U80 = M15



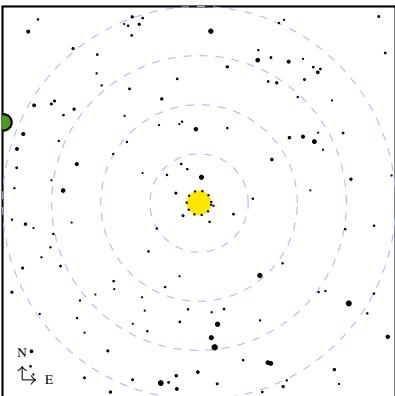
U83 = NGC 7160



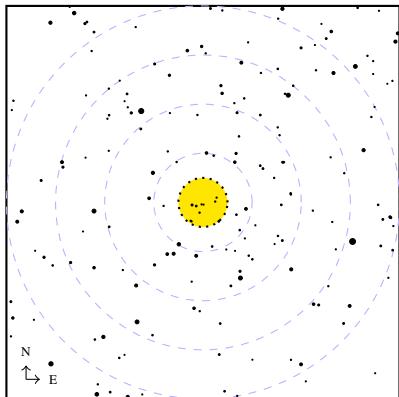
U81 = M2



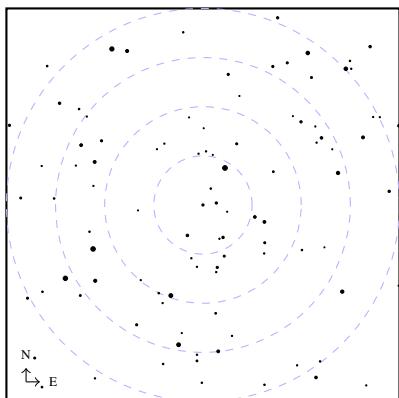
U84 = NGC 7209



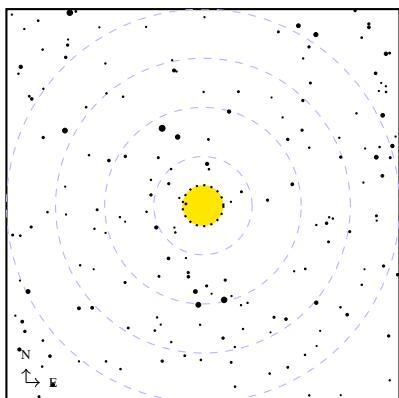
U85 = NGC 7243



U86 = NGC 7662



U87 = NGC 7789



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