Inferring Motion from Doppler Radar

Mini-lesson by Aryeh Drager, Ph.D.

Feel free to adapt and use. All images were created by me (except for the radar antenna icon, which is copyright-free and built into Microsoft Office)

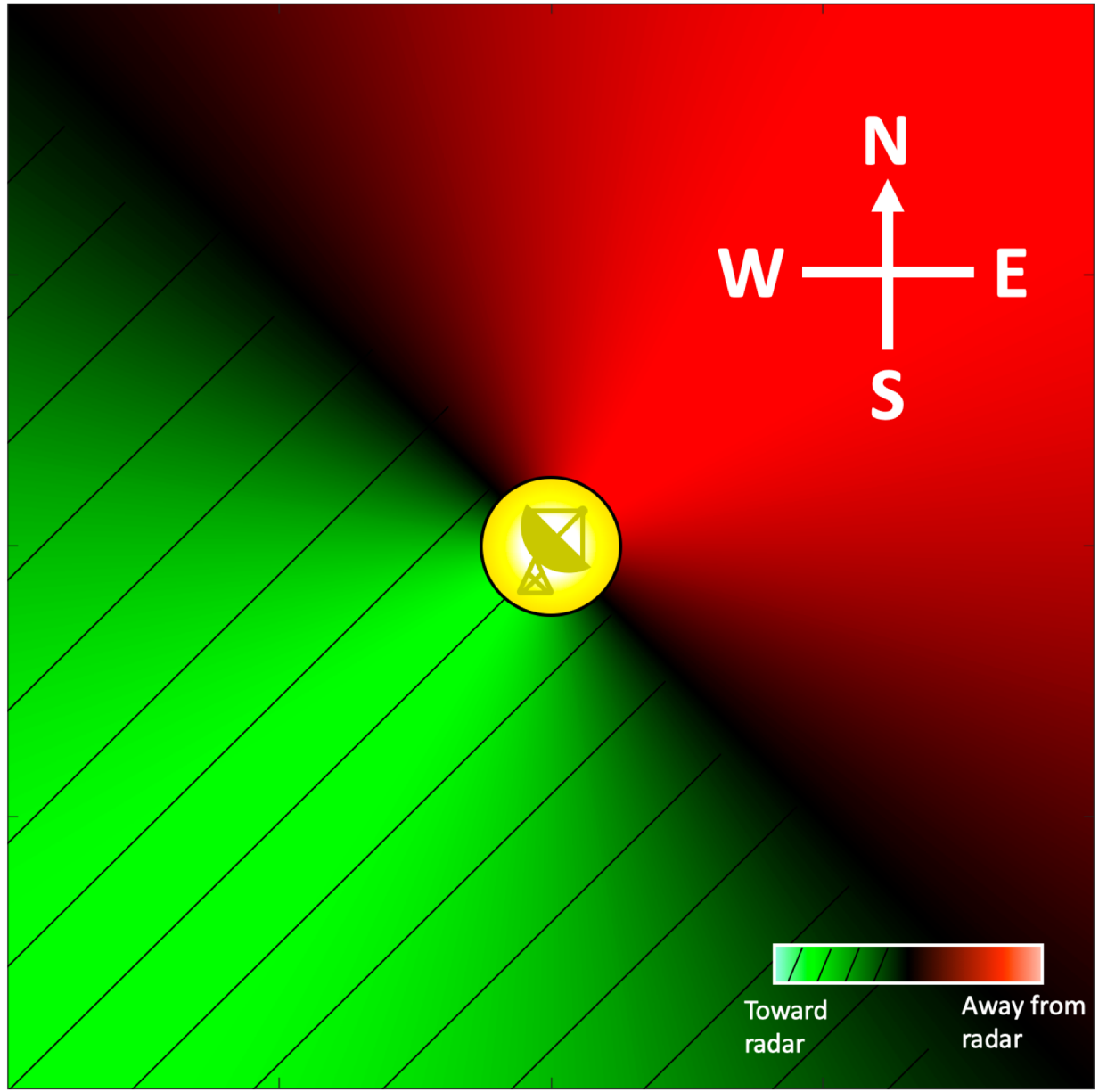
Each slide is duplicated: The first version is a plain image and cannot be edited. The second version can be edited.

What direction is the wind blowing **from**?

From the northeast
From the northwest
From the southeast
From the southwest

Note: The green region contains hatching to aid colorblind students.

This symbol shows the location of the spinning radar antenna/machine.



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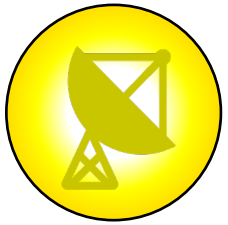

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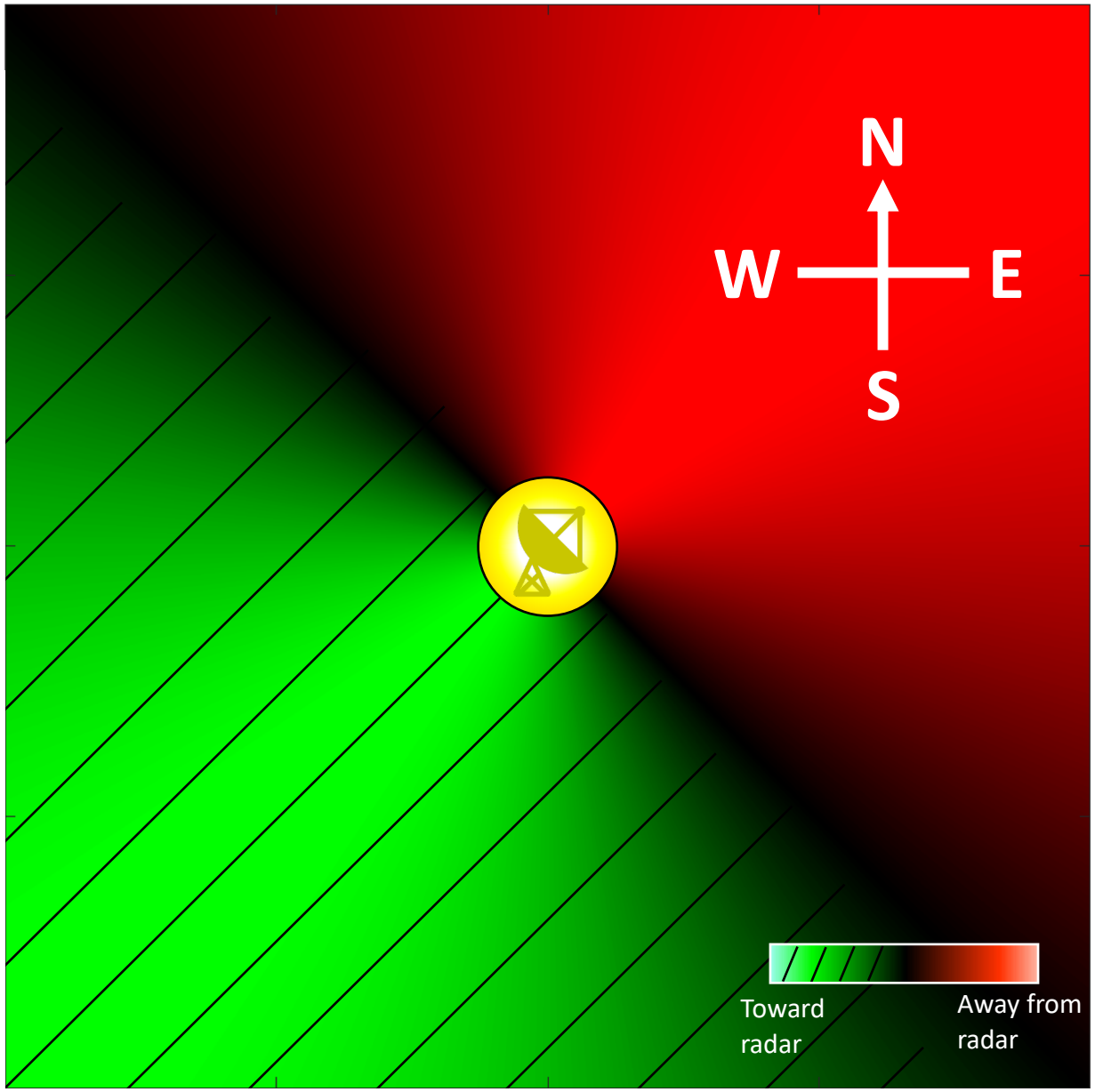

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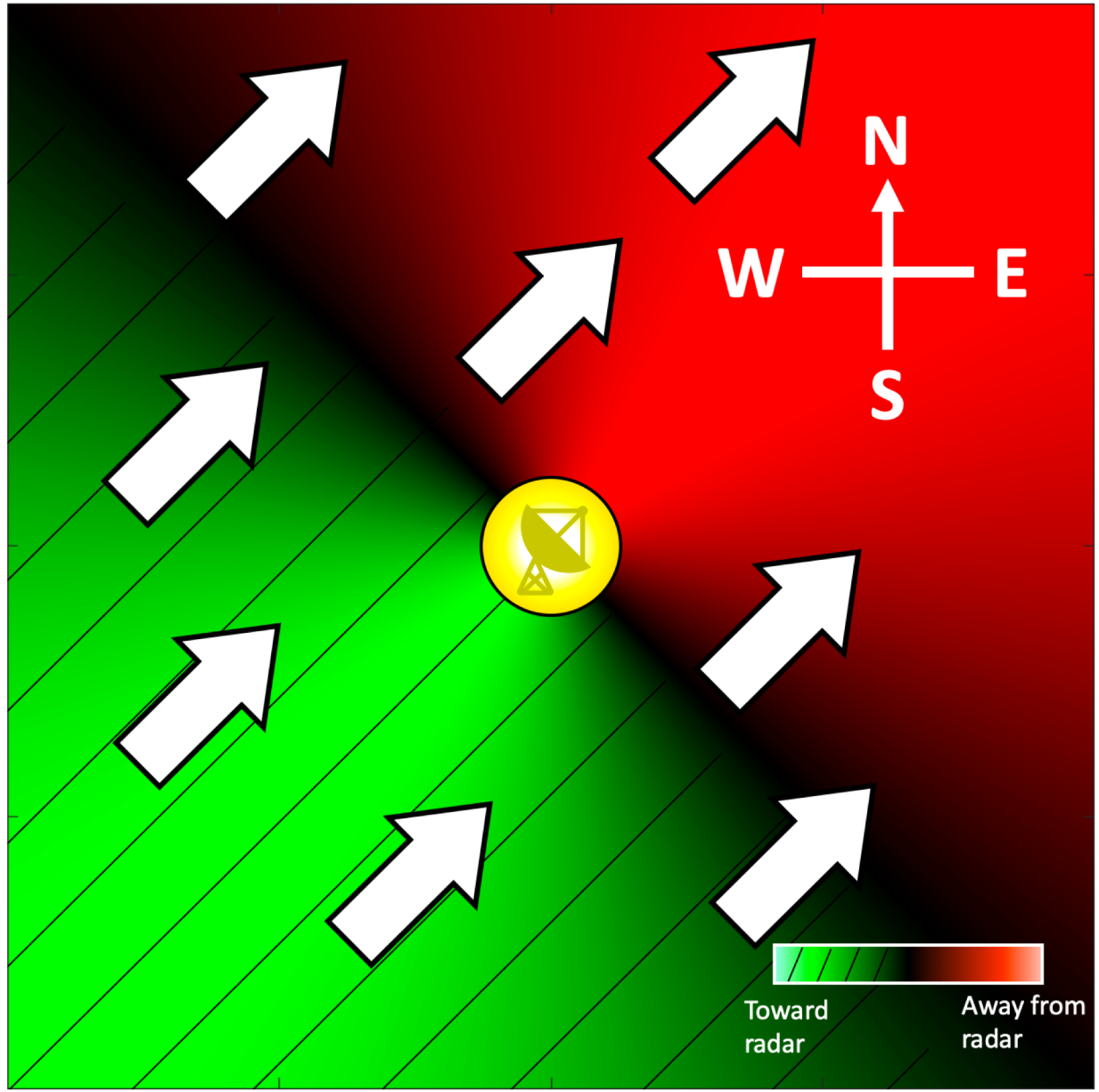

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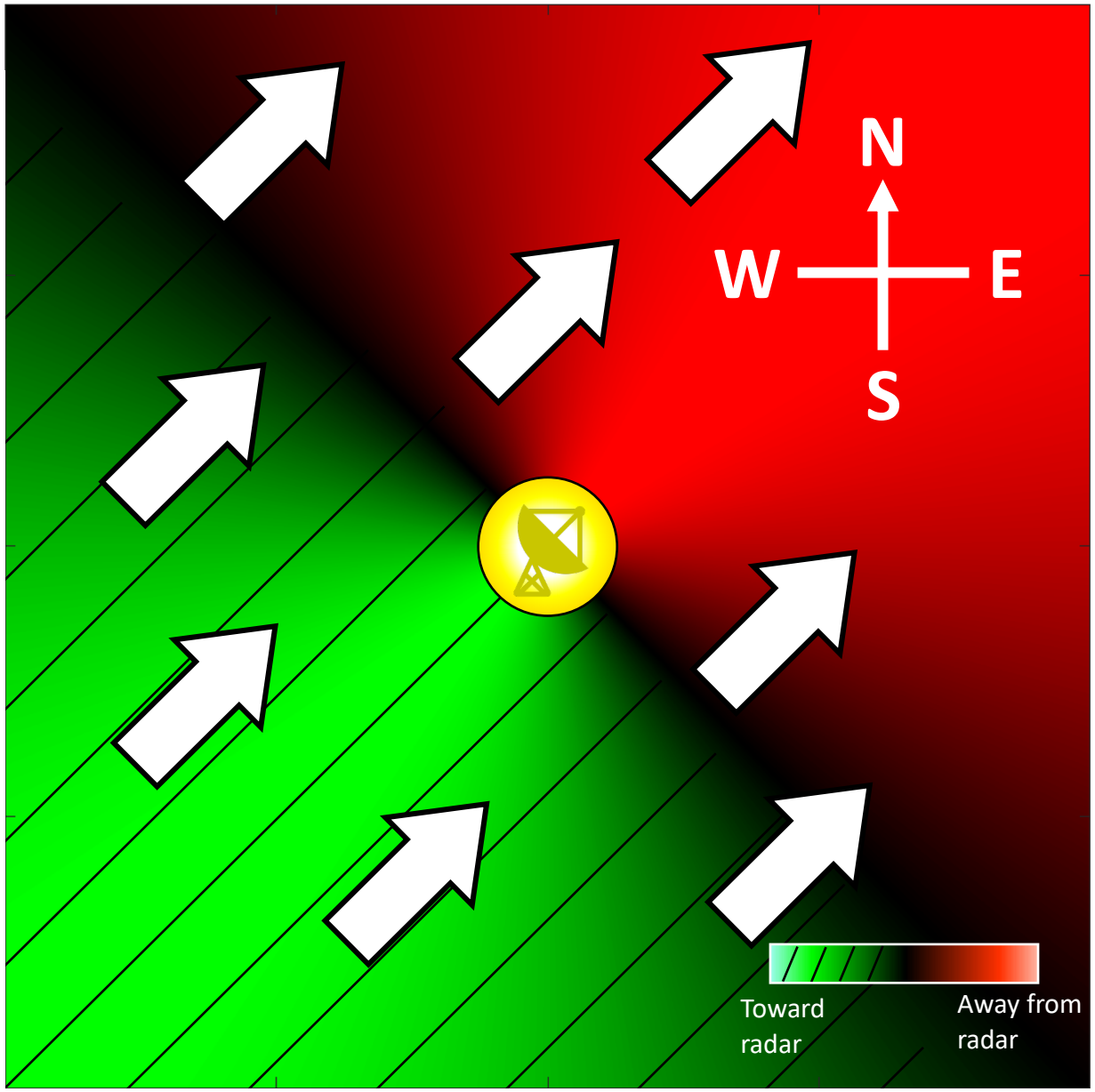
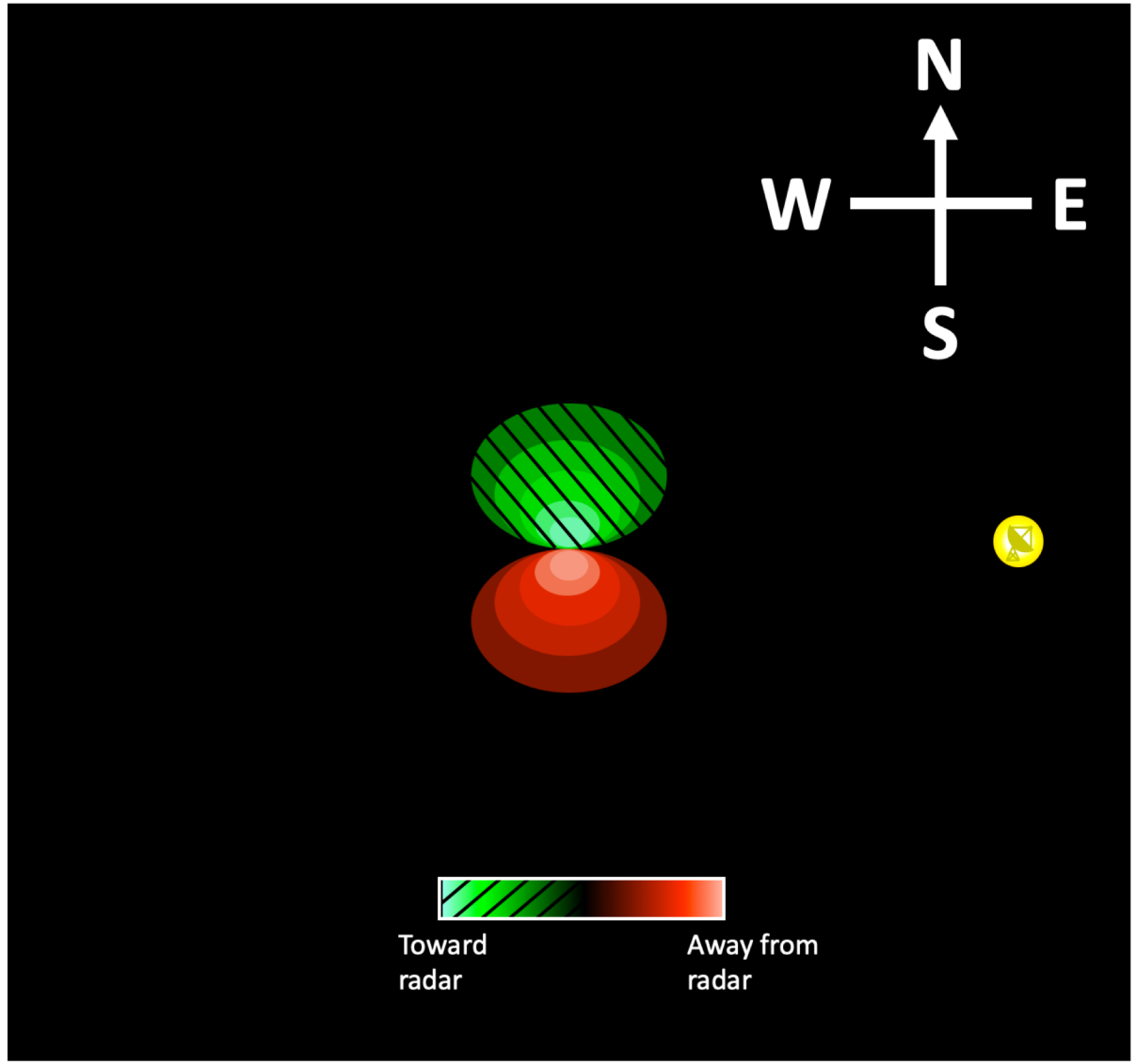


This is a Doppler velocity image corresponding to a supercell thunderstorm.
Now, the radar antenna/machine is on the east side of the map.
Is the storm rotating **clockwise** or counter-clockwise?



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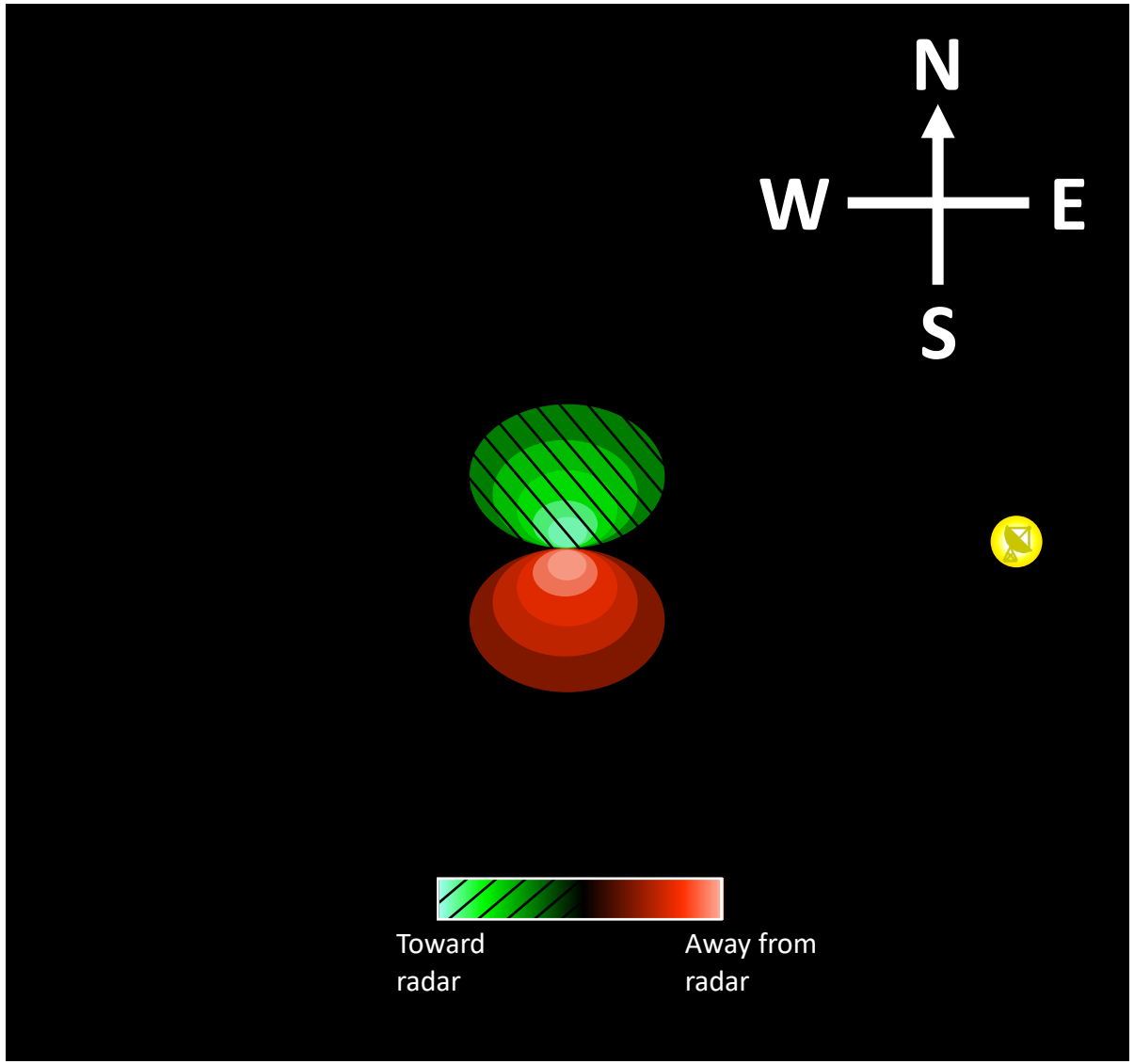

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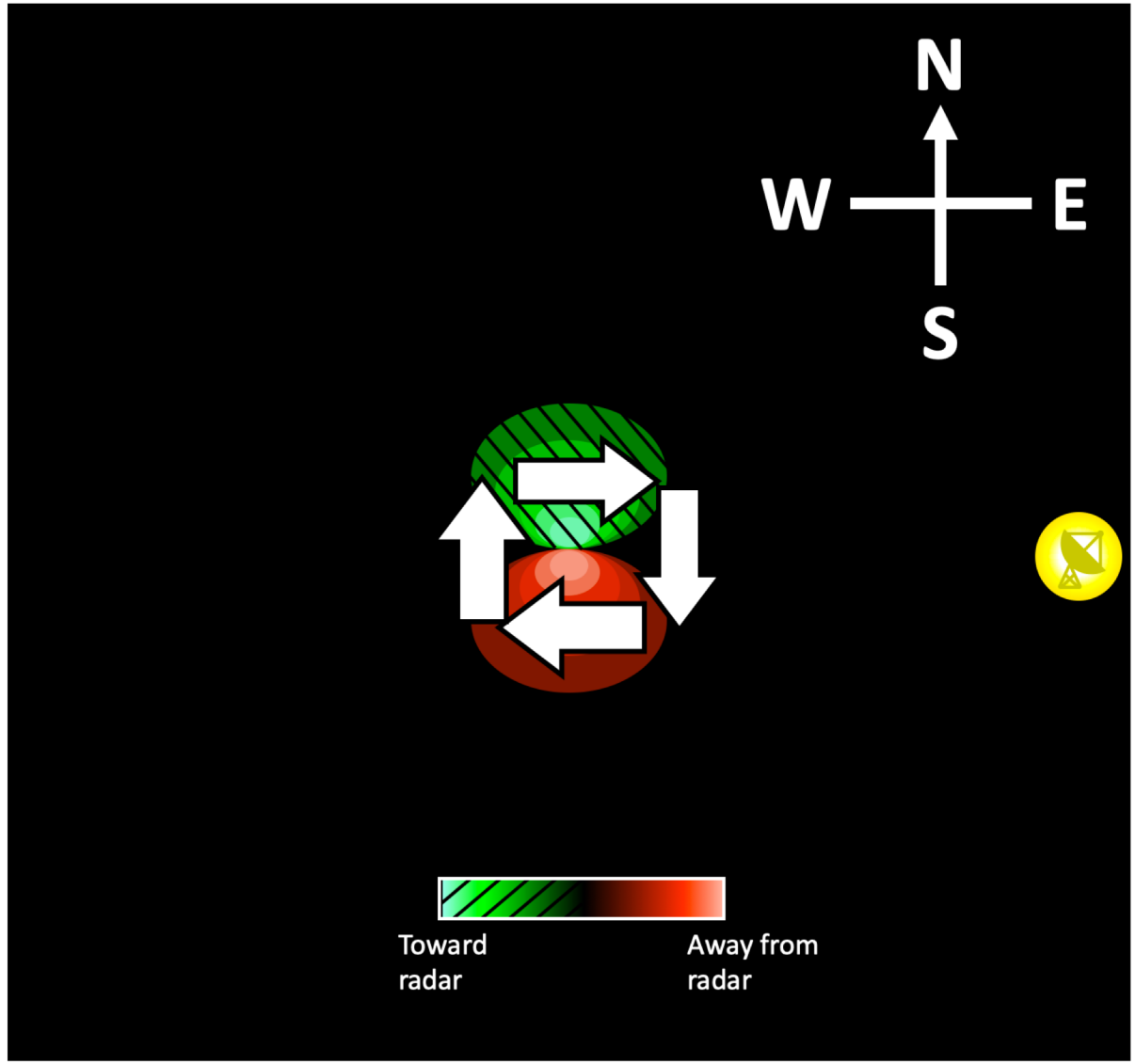

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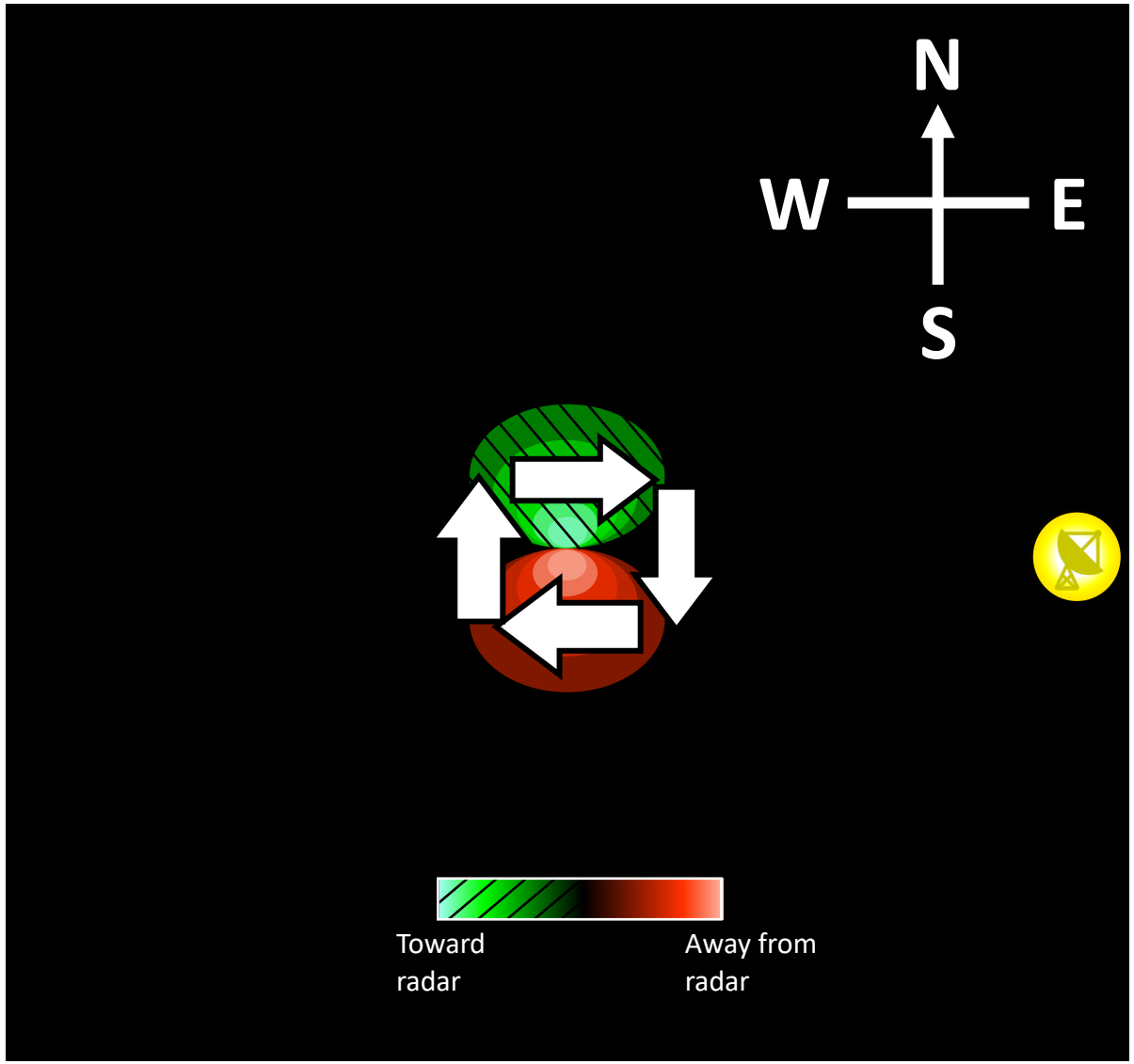

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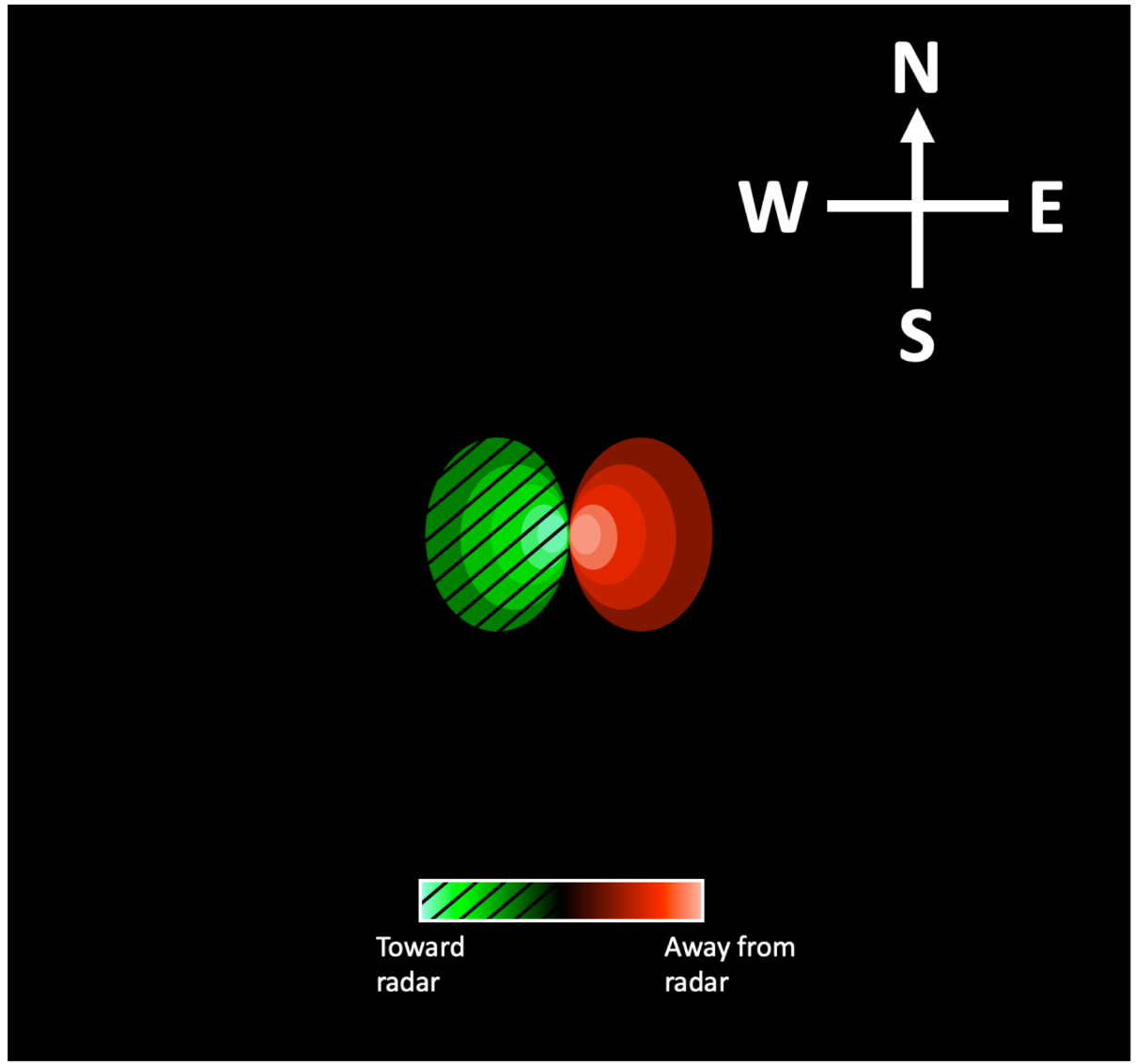

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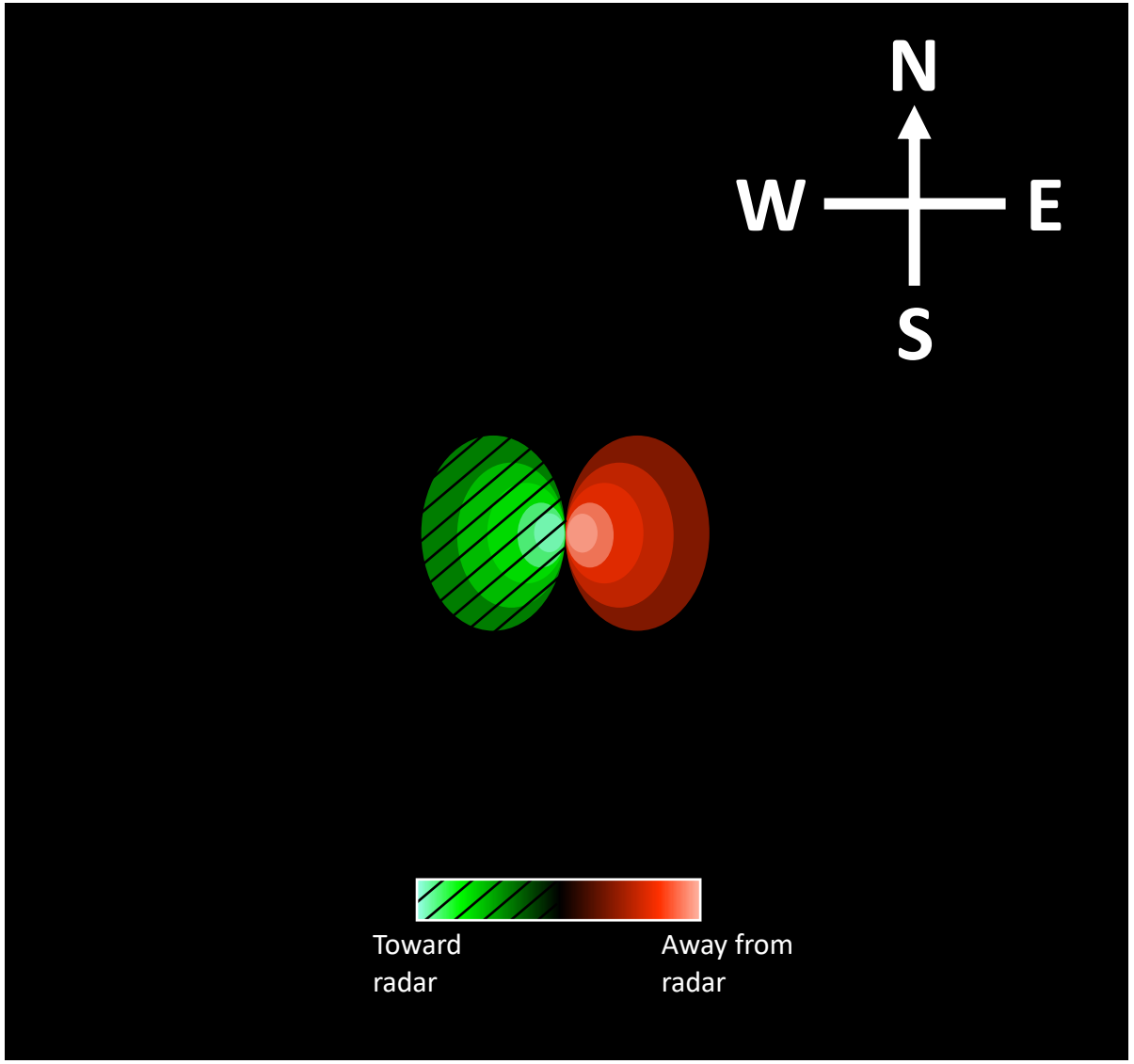

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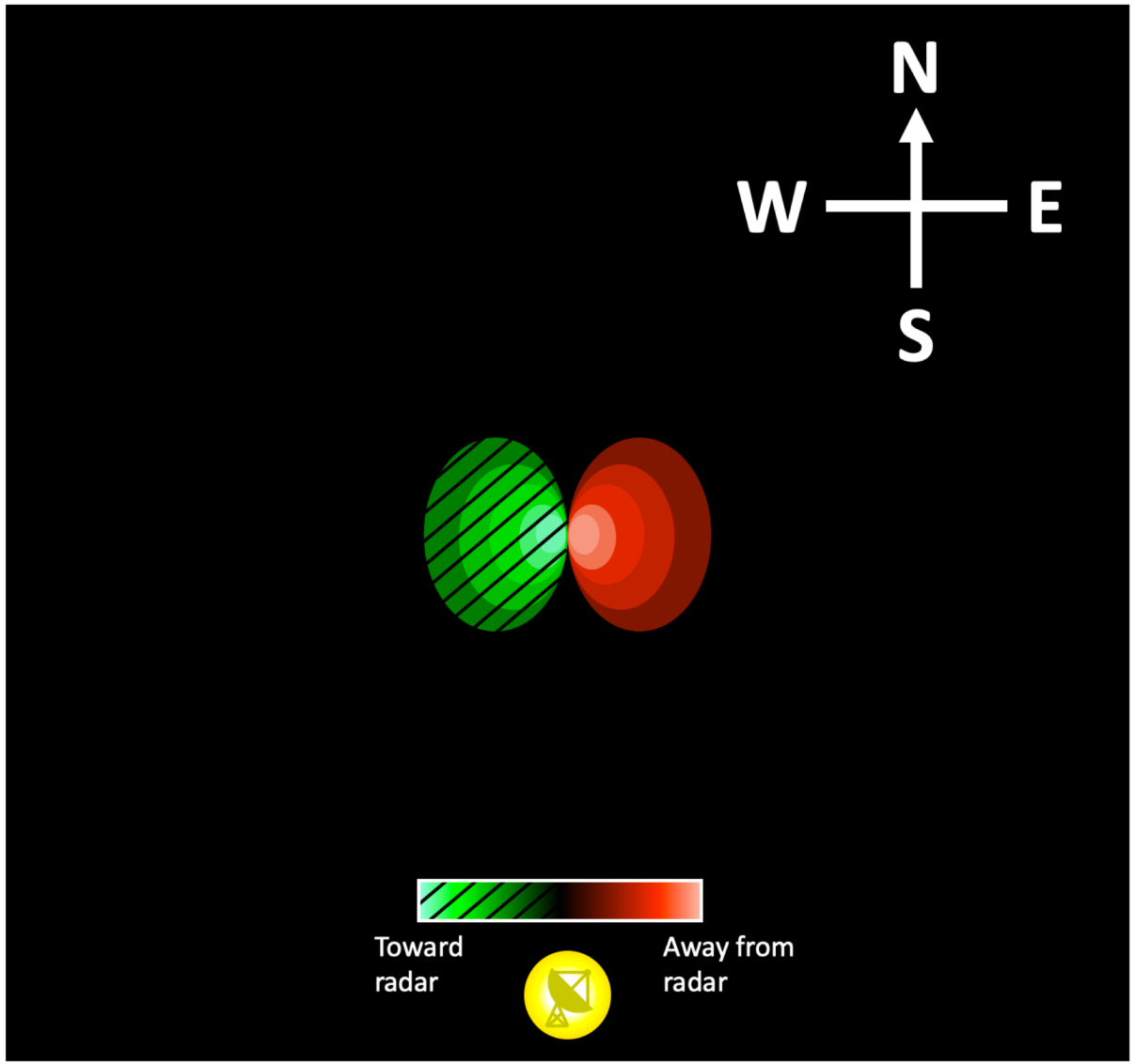

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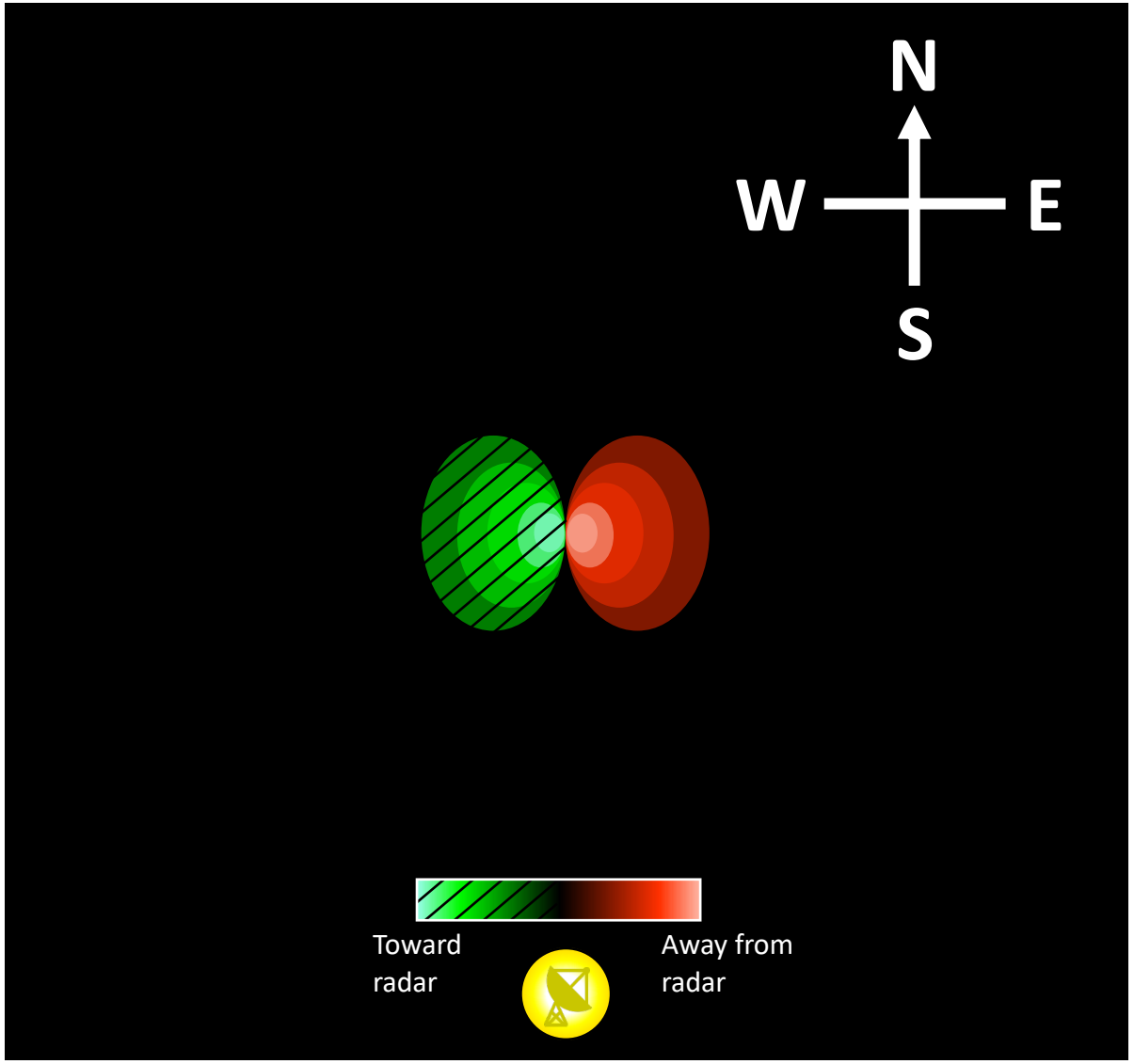

Matlab code for plotting radial component of a constant wind field with the radar antenna in the center of the domain.

```
clear all;
close all;

x_vec = -1:0.001:1;
y_vec = -1:0.001:1;

[xx,yy] = meshgrid(x_vec,y_vec);

the_rad = sqrt(xx.^2 + yy.^2);
the_theta = atan2(yy,xx);

u = ones(size(xx)); % multiply this by the desired u-velocity
v = ones(size(xx)); % multiply this by the desired v-velocity

rad_vel = u.*cos(the_theta) + v.*sin(the_theta); % not sure if this is correct

colormap_part1 = [linspace(0,0,101)', ...
   linspace(1,0,101)', ...
   linspace(0,0,101)'];
colormap_part2 = [linspace(0,1,101)', ...
   linspace(0,0,101)', ...
   linspace(0,0,101)'];
colormap_to_use = [colormap_part1;colormap_part2(2:end,:)];


figure(1)
contourf(xx,yy,rad_vel,201,'LineStyle','none')
axis equal
colormap(colormap_to_use)
colorbar EastOutside
```