

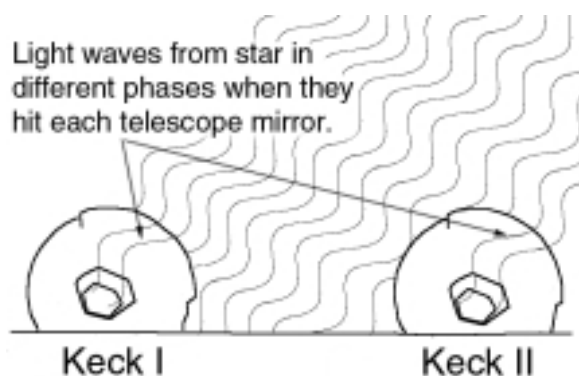
Sequence n° 7: measuring distance

ACTIVITY 1 : How far away are stars?

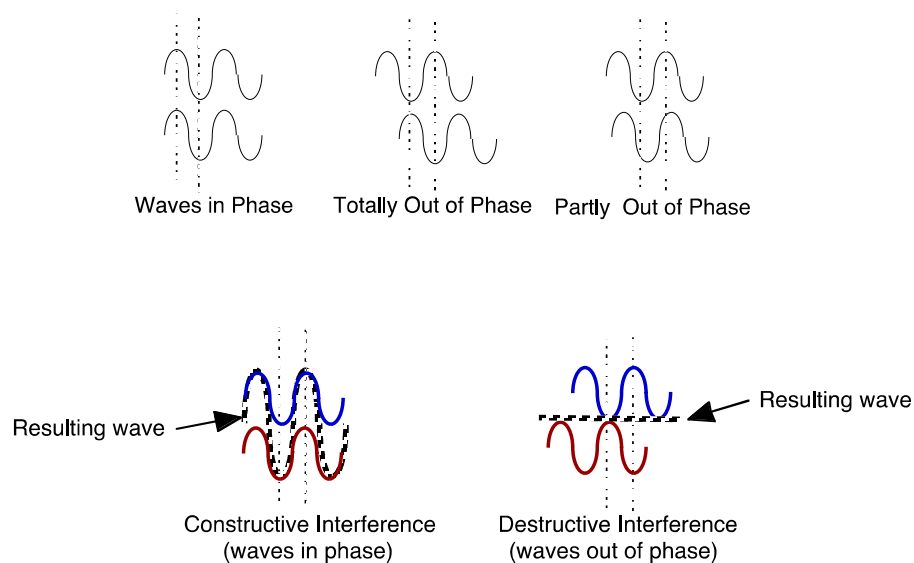
Document 1: The Keck Interferometer

Scientists can observe and measure light's wave behavior using interferometry. A star shines its light toward Earth. Like ripples on a pond, except in three dimensions, the light spreads out from the star in a sphere. But, because the distance is so great, each wave front is, for all practical purposes, flat rather than rounded by the time it reaches Earth.

Atop Mauna Kea, an extinct volcano on the “Big Island” of Hawaii, two giant telescopes sit 85 meters apart. Each telescope's mirror points toward the same star, but greet the **wave front** coming from that star at slightly different times. So the wave that Keck I sees will be slightly **out of phase** with the wave Keck II sees. Because the star is so very far away, the difference will be very tiny. The telescopes include a lot of other equipment and computer programs that combine the images from the two telescopes, analyze the **interference patterns**, and, using that information, figure out with great precision the exact position of the star and its **size**.



Source: How Can Wave Behavior Help Us Find Planets Around Distant Stars? *Originally published in The Technology Teacher, March 1999, by the International Technology Education Association*

Document 2: interference

Source: How Can Wave Behavior Help Us Find Planets Around Distant Stars? *Originally published in The Technology Teacher, March 1999, by the International Technology Education Association*

■ **Acquiring vocabulary**

English	French
wave front	
out of phase	
interference patterns	
Constructive/destructive interference	

■ **Presenting**

As a team, prepare a short presentation in order to explain how the two Keck telescopes enable to measure a distance

Activity summary

What you must remember:

- **constructive/destructive interference**
- **interferometer**

Skills linked to the curriculum:

Compétences	Capacités à maîtriser
– APP	Faire le lien entre un problème proposé et le phénomène d'interférence.
– ANA	Relier les informations présentées dans les documents concernant les interférences aux connaissances sur la mesure de distance par interférométrie. Associer la notion d'interférences à la superposition de deux ondes synchrones. Expliquer l'existence d'un retard de propagation entre deux ondes pour un dispositif interférentiel simple.
– COM	Formuler et argumenter des réponses structurées Formuler et présenter une conclusion Présenter à l'oral en utilisant du vocabulaire spécifique