WHAT IS CLAIMED IS:

1. A laser processing apparatus comprising:

a chuck table that holds a wafer;

a laser beam irradiation unit that irradiates the wafer held by the chuck table with a laser beam; and

a feed mechanism that executes processing feed of the chuck table and the laser beam irradiation unit in an X-axis direction and a Y-axis direction orthogonal to the X-axis direction,

wherein the laser beam irradiation unit includes

a laser oscillator that emits the laser beam,

a beam condenser that condenses the laser beam emitted by the laser oscillator and positions a condensed point to the wafer held by the chuck table,

a condensed point position adjuster that is disposed between the laser oscillator and the beam condenser and adjusts a position of the condensed point, and

an upper surface position detector that detects an upper surface position of the wafer,

wherein the upper surface position detector includes

a detection light source that emits detection light of a wide wavelength band, and

a selector that selects detection light with a specific wavelength from the detection light emitted by the detection light source,

wherein the upper surface position detector selects, by the selector, the detection light with the specific wavelength in the detection light emitted by the detection light source, and guides the detection light to an upper surface of the wafer held by the chuck table and calculates the upper surface position of the wafer by reflected light arising from reflection at the upper surface of the wafer, and

wherein the apparatus further comprises a controller configured to control angle adjusting actuators of the condensed point position adjuster such that a distance from the upper surface of the wafer to the condensed point of the laser beam is kept constant during processing.

2. The laser processing apparatus according to claim 1,

wherein the selector includes a plurality of band-pass filters that allow transmission of detection light with specific wavelengths different from each

other, and selects any of the plurality of band-pass filters and positions the selected band-pass filter to an optical path of the detection light to select the detection light with the specific wavelength.

3. The laser processing apparatus according to claim 1,

wherein the selector selects the detection light with a wavelength that maximizes an amount of received light.

4. The laser processing apparatus according to claim 1,

wherein the upper surface position detector includes

a combiner that causes the detection light that is the detection light emitted by the detection light source and has passed through the selector and a first beam splitter sequentially to merge into between the laser oscillator and the condensed point position adjuster,

a second beam splitter that splits reflected light arising from reflection of the detection light that has passed through the condensed point position adjuster and the beam condenser at the upper surface of the wafer held by the chuck table into a first optical path and a

second optical path through the combiner and the first beam splitter,

a filter that is disposed in the first optical path and causes a part of the split reflected light to pass through the filter,

a first light receiving element that receives the reflected light that has passed through the filter, and

a second light receiving element that is disposed in the second optical path and receives whole of the split reflected light, and

the upper surface position detector calculates the upper surface position of the wafer from comparison between an amount of received light at the first light receiving element and an amount of received light at the second light receiving element.

5. The laser processing apparatus according to claim 1,

wherein the upper surface position detector includes

an irradiating end part that irradiates the upper surface of the wafer with the detection light emitted by the detection light source with an angle α of incidence,

a light receiving end part that receives reflected light arising from reflection of the detection light with which the irradiation is executed from the irradiating end part at the upper surface of the wafer, and

an image sensor that measures a position of the reflected light received by the light receiving end part, and

the upper surface position detector calculates the upper surface position of the wafer on a basis of the position of the reflected light detected by the image sensor.