

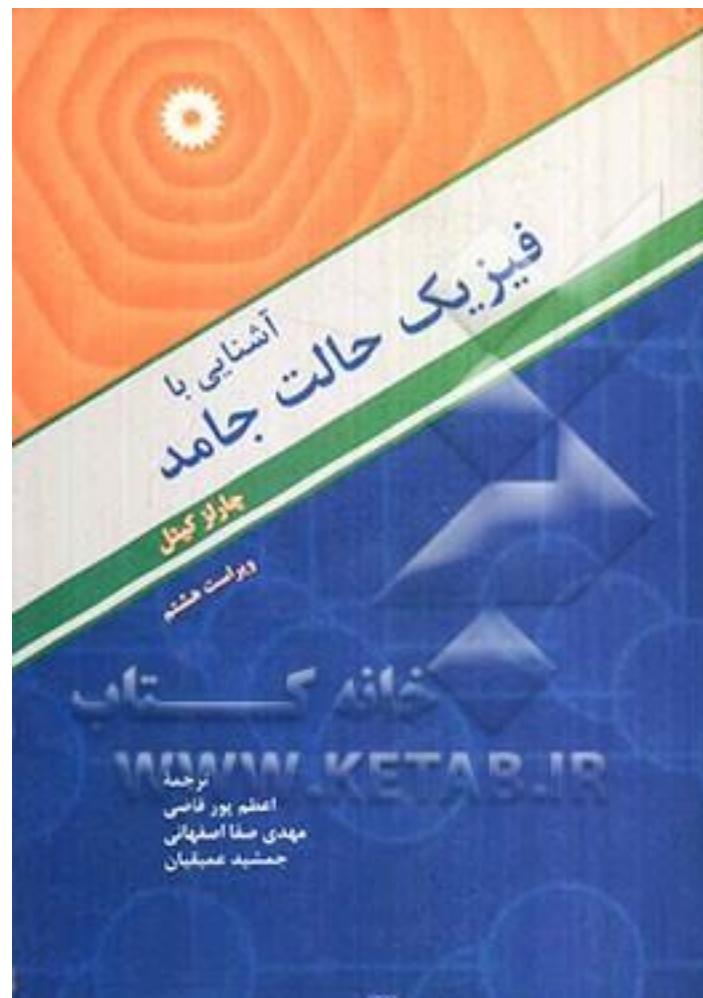
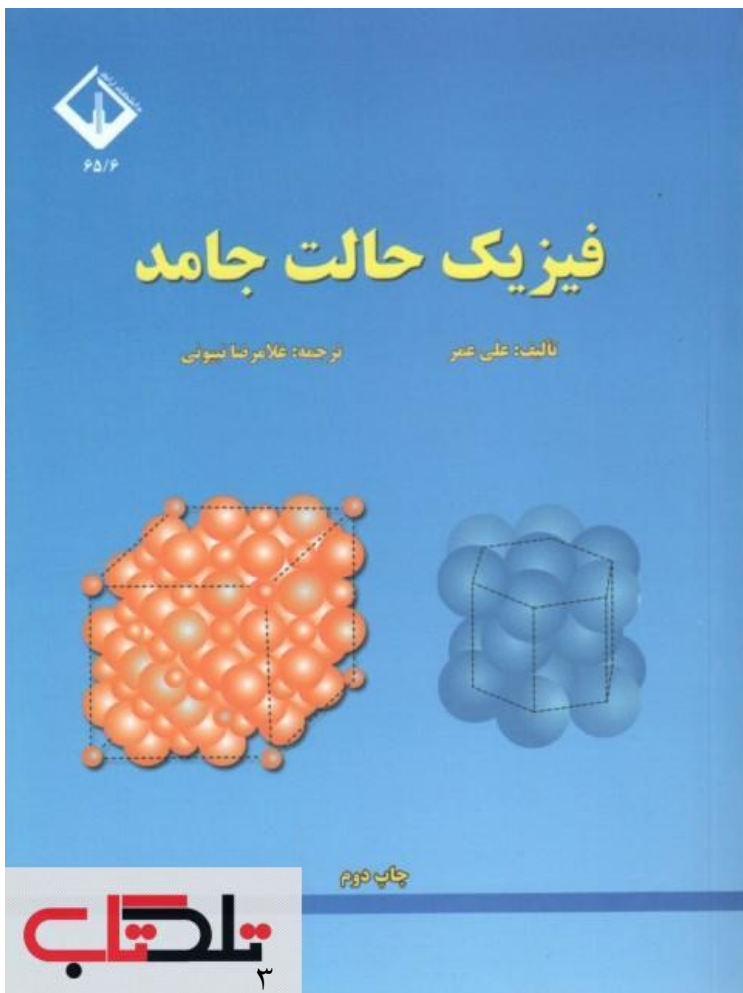
وَيْدِي فِي الْحَبْلِ

The image displays the Arabic phrase "وَيْدِي فِي الْحَبْلِ" (Widi fi al-Habl) in a highly stylized, cursive calligraphic font. The text is written in black ink on a white background with a light gray checkerboard pattern. The calligraphy is characterized by thick, bold strokes and intricate flourishes. Red ink is used for various annotations, including small letters and lines that likely indicate specific phonetic or grammatical features. The word "وَيْدِي" (Widi) is on the right, followed by "فِي" (fi) in a smaller, more delicate script, and "الْحَبْلِ" (al-Habl) on the left. A long, sweeping horizontal line connects the two main parts of the text.

عنوان درس

فیزیک حالت جامد ۲  
Solid-state physics 2

## منابع



## فیزیک حالت جامد چیست؟

- ❖ Solid-state physics is the study of rigid matter, or solids, through methods such as quantum mechanics, crystallography, electromagnetism, and metallurgy.
- ❖ It is the largest branch of condensed matter physics.
- ❖ Solid-state physics studies how the large-scale properties of solid materials result from their atomic-scale properties.
- ❖ Thus, solid-state physics forms a theoretical basis of materials science.
- ❖ It also has direct applications, for example in the technology of transistors and semiconductors.

## حوزه بحث فیزیک حالت جامد

- ❖ Solid materials are formed from densely packed atoms, which interact intensely.
- ❖ These interactions produce the mechanical (e.g. [hardness](#) and [elasticity](#)), [thermal](#), [electrical](#), [magnetic](#) and [optical](#) properties of solids.
- ❖ Depending on the material involved and the conditions in which it was formed, the atoms may be arranged in a regular, geometric pattern ([crystalline solids](#), which include [metals](#) and ordinary [water ice](#)) or irregularly (an [amorphous solid](#) such as common window [glass](#)).

## حوزه بحث فیزیک حالت جامد

- ❖ The bulk of solid-state physics, as a general theory, is focused on crystals.
- ❖ Primarily, this is because the periodicity of atoms in a crystal — its defining characteristic — facilitates mathematical modeling.
- ❖ Likewise, crystalline materials often have electrical, magnetic, optical, or mechanical properties that can be exploited for engineering purposes.

## حوزه بحث فیزیک حالت جامد

- ❖ The forces between the atoms in a crystal can take a variety of forms.
- ❖ For example, in a crystal of [sodium chloride](#) (common salt), the crystal is made up of [ionic sodium](#) and [chlorine](#), and held together with [ionic bonds](#).
- ❖ In others, the atoms share [electrons](#) and form [covalent bonds](#). In metals, electrons are shared amongst the whole crystal in [metallic bonding](#).
- ❖ Finally, the noble gases do not undergo any of these types of bonding. In solid form, the noble gases are held together with [van der Waals forces](#) resulting from the polarisation of the electronic charge cloud on each atom.
- ❖ The differences between the types of solid result from the differences between their bonding.