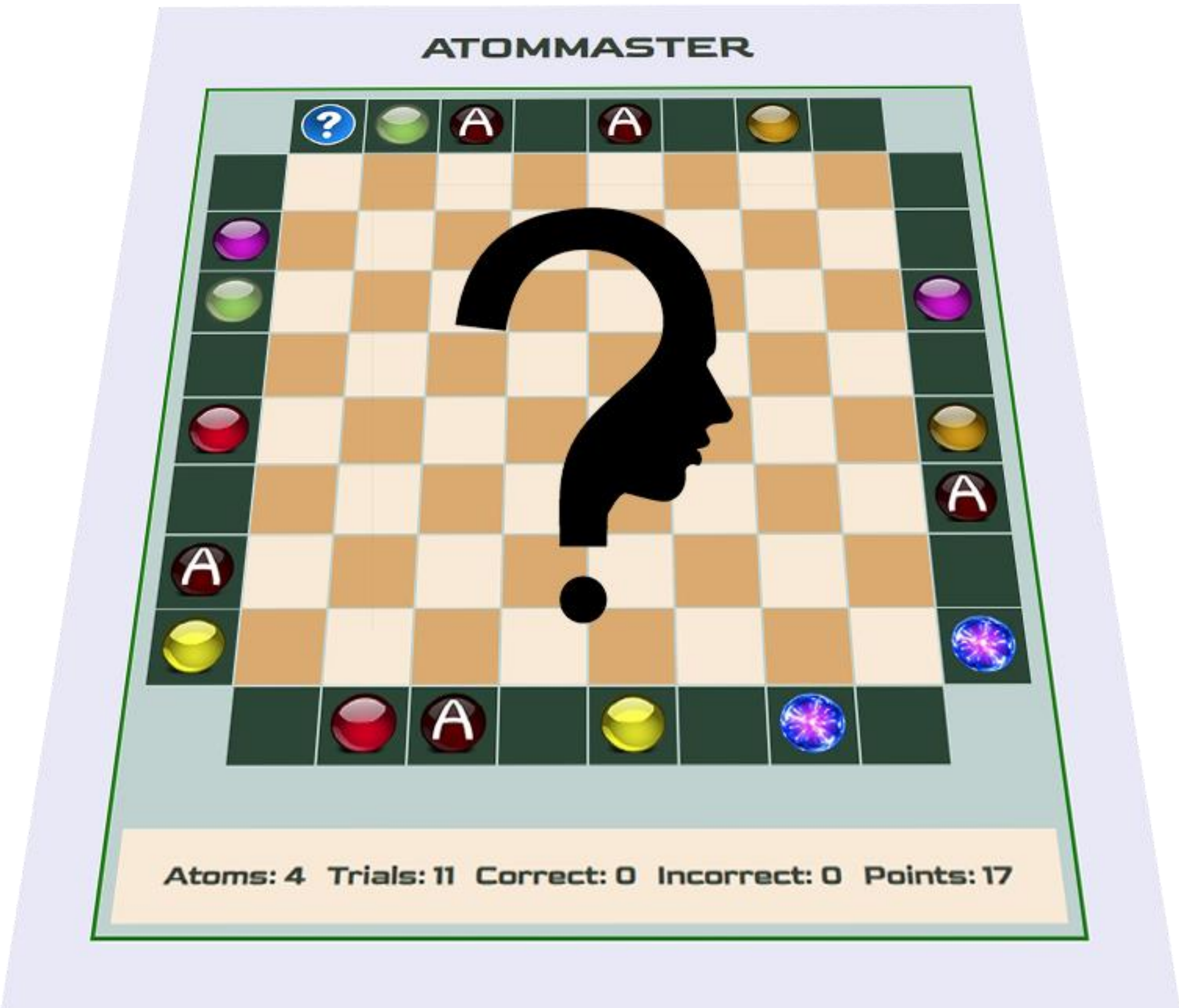
Atommaster



Scope for mind and logic

A Sir Cabirus Tech Arts Game ©2022

Based on the board game Black Box by Parker ©1978

A few words of introduction

Atommaster is a game that focuses on logical thinking. The computer hides a molecule of maximum six atoms on the experimental field, which consists of 8 X 8 squares. The player has the task of determining the position of the atoms. To do this, he directs beams into the experimental field and draws conclusions about the structure of the molecule based on the results obtained. By default, four atoms are hidden. The number of atoms to be searched for can be varied by the player between a minimum of three and a maximum of six atoms.

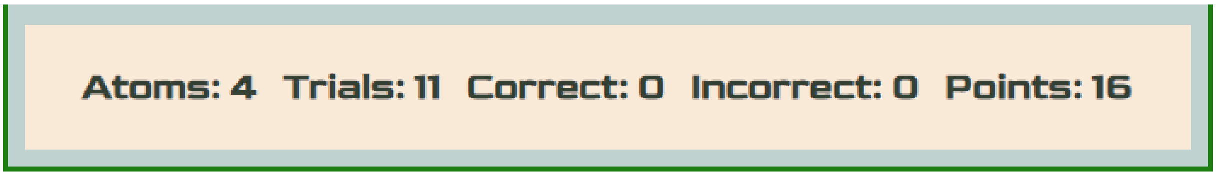
Game rules and operation

The experiment field has 16 entry points that the query cursor can reach. The query cursor, a white question mark on a blue background, can be moved around the experimental field in both directions

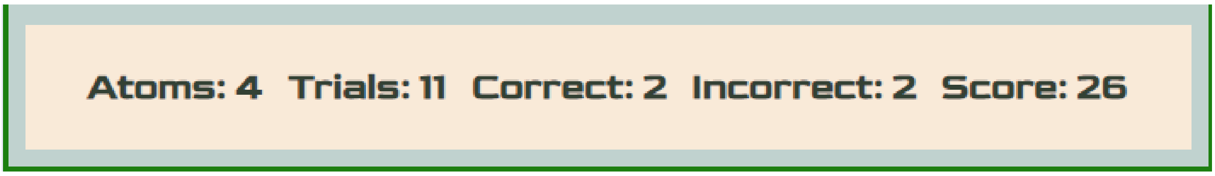
using the [Cursor left] and [Cursor right] keys. The [Return] key is used to direct an examination beam into the experimental field at the position of the query cursor. The query cursor is then moved counterclockwise to the next free position and the result is displayed at the beam entry point. This can result in an absorption (the beam hits an atom), a reflection (the beam exits at the entry point) or a beam pass (with different entry and exit points). A hit or an absorption is marked with an A, a reflection is marked with an R, the entry and exit of a beam is marked with two marbles of the same color.

The number of hidden atoms can be gradually increased by the player up to six atoms or decreased down to three atoms. This is only possible until the game has started. The game starts as soon as a beam has been fired for the first time. Pressing [SHIFT] + [Cursor up] increases the number of atoms, pressing [SHIFT] + [Cursor down] decreases it. The number of atoms to be determined is displayed in the status bar below the experiment field.

The goal is to determine the molecule with as few trials or points as possible. An absorption and a reflection cost one point, a deflection or a miss cost two points. Each atom not determined costs 5 points. The addition of all points provides the score at the end of a game.



The status bar shows from left to right the number of atoms to be determined, the number of trials, the number of correctly determined atoms, the number of incorrectly or not determined atoms and the running points.

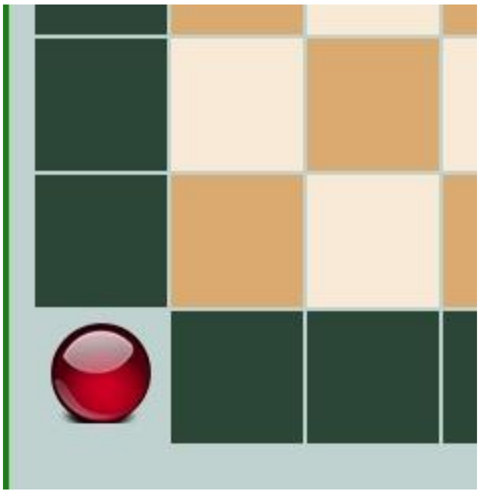


The information about the correctly and incorrectly determined atoms is only displayed after the player has queried the result via the [E] key and thus ended the game. In this case, the points are replaced by the achieved score.

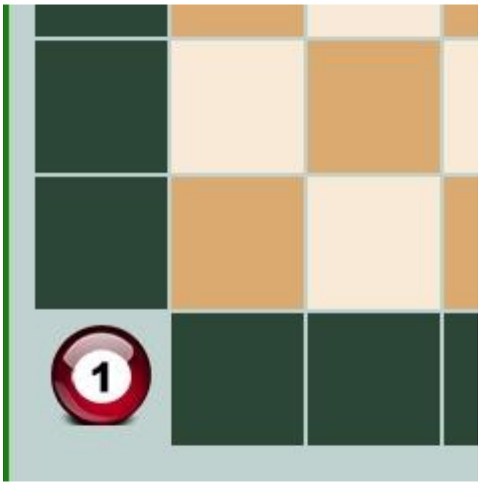
Beam passes are indicated in standard mode by marbles of the same color in random color sequence at the entry and exit points of the examination beam. The standard mode is automatically active with each new game. Persons who find it difficult to distinguish different color tones can change the display mode of the beam passes before starting the game.

The display mode changes to the so-called billiard ball mode by pressing the [B] key. In the billiard ball mode, the marbles of the beam passes are given a number that makes them look like billiard balls. In this mode the marbles appear in the numerical order and not randomly as it is the case in the standard mode.

Pressing the [B] key several times toggles between the standard and billiard ball modes. The respective display mode for beam passes is displayed next to the experiment field at the bottom left as soon as the [B] key has been pressed for the first time. Switching is only possible before the start of the game, after the start of the game the display of the mode is deleted.

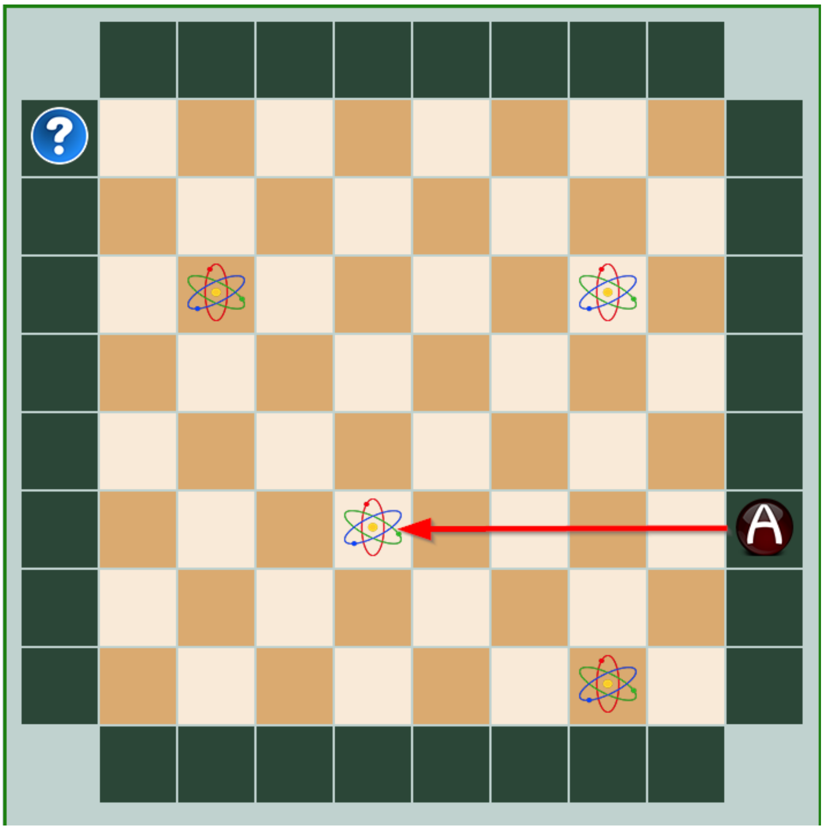


Standard Mode



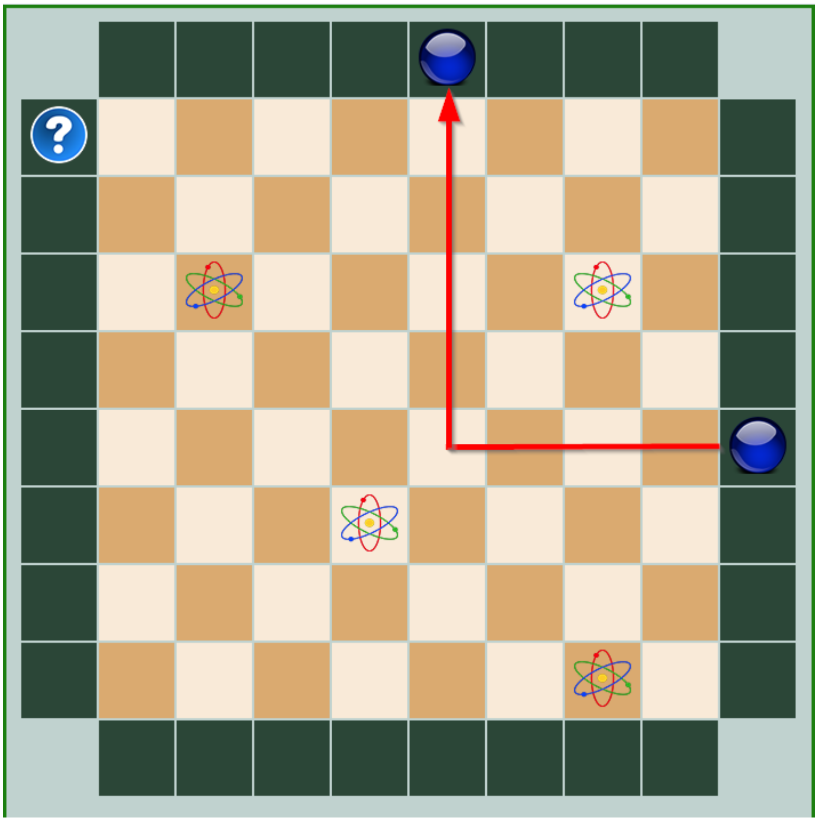
Billiard Ball Mode

Absorption



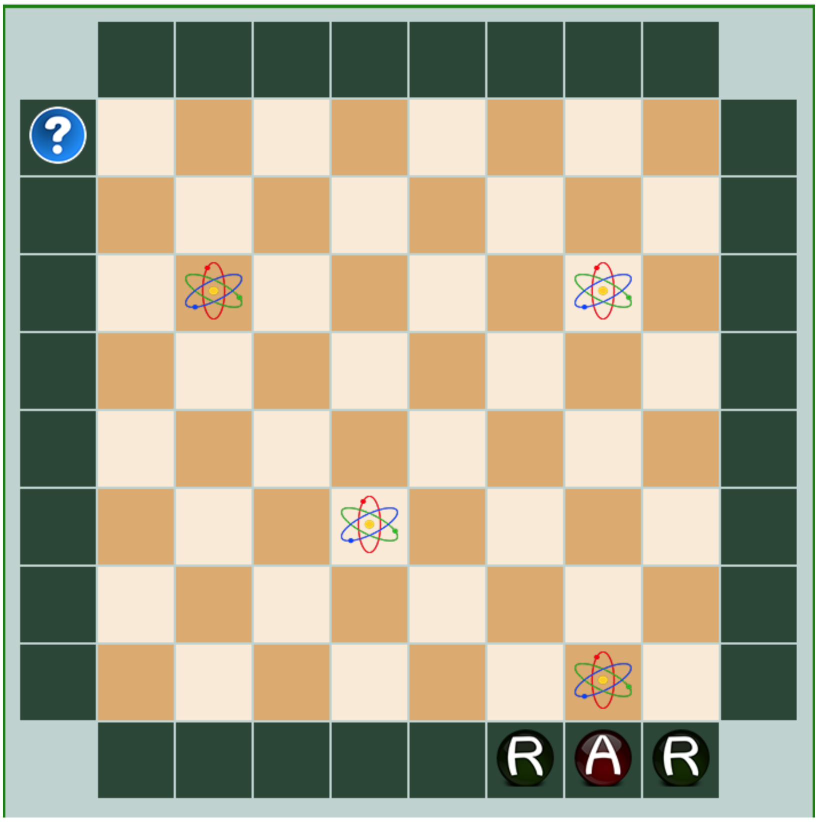
Atoms can interact with beams in three ways. A direct impact of a beam on an atom is a "hit". Thus, the beam shot into the experimental field from the left hits an atom directly and produces a "hit", which is marked with an "A". A beam that hits an atom does not exit the experimental field, it is absorbed.

Deflection



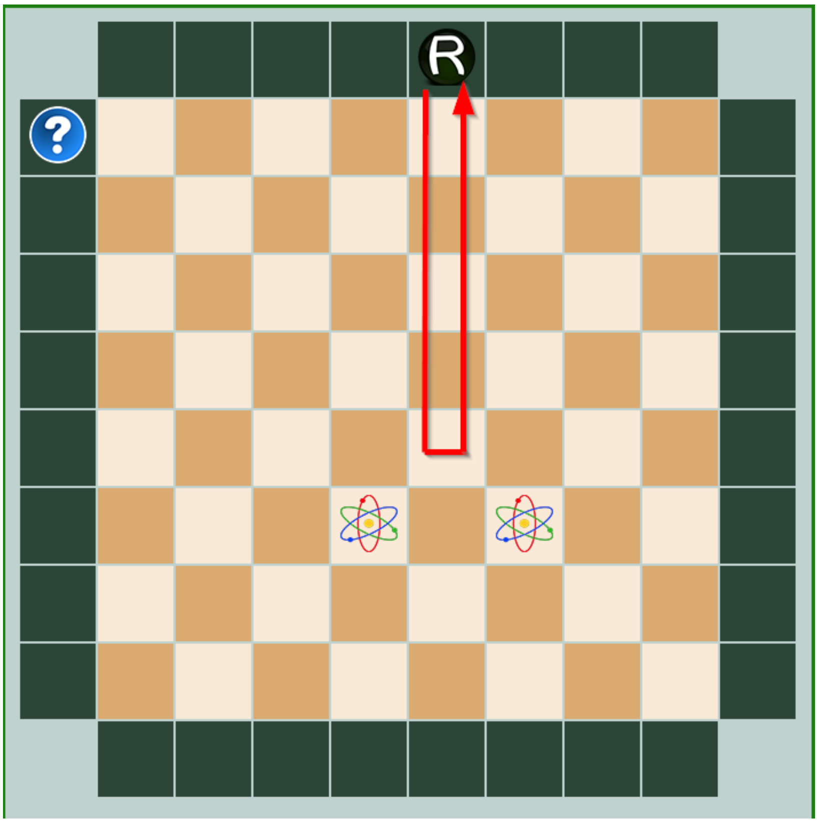
The interaction resulting from a beam hitting one side of the atom, not directly, but right next to it, is called "deflection". The deflection angle for this beam / atom interaction is 90 degrees. The beam in the picture is deflected by the atom on the left and leaves the experimental field as shown. The entry and exit points of the beam are marked with two marbles of the same color.

Reflection



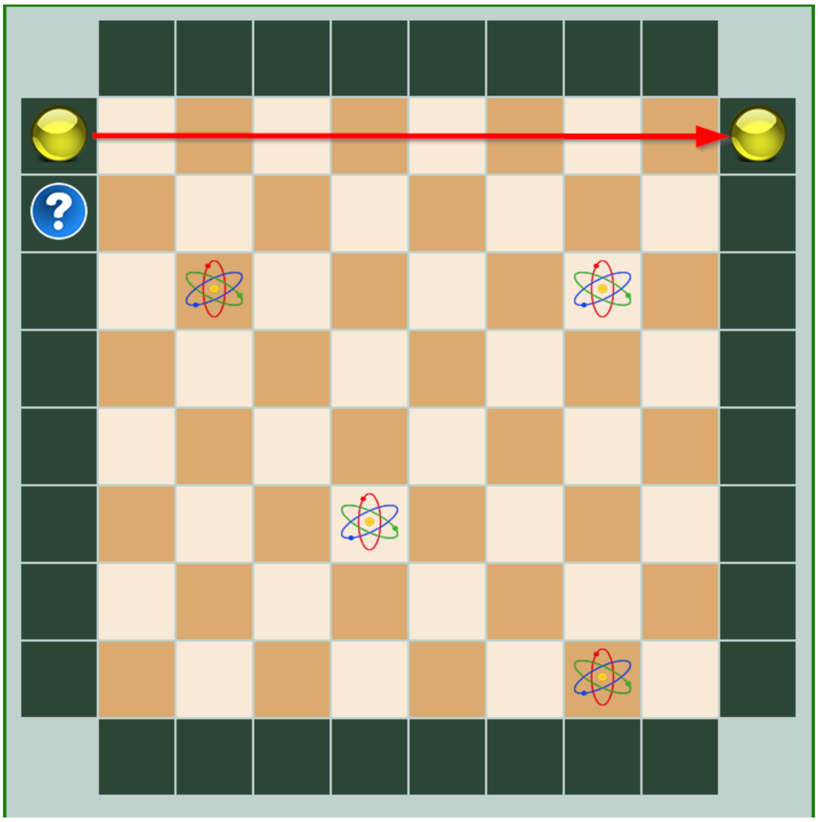
The last type of interaction of a beam with an atom is a "reflection", which is marked with an "R". This occurs under two circumstances. If an atom is at the edge of the experimental field, any beam directed into the field directly next to it will cause a reflection.

The beams at the bottom left and right each produce a reflection due to the atom at the edge. The beam in the middle hits the atom directly and is absorbed.



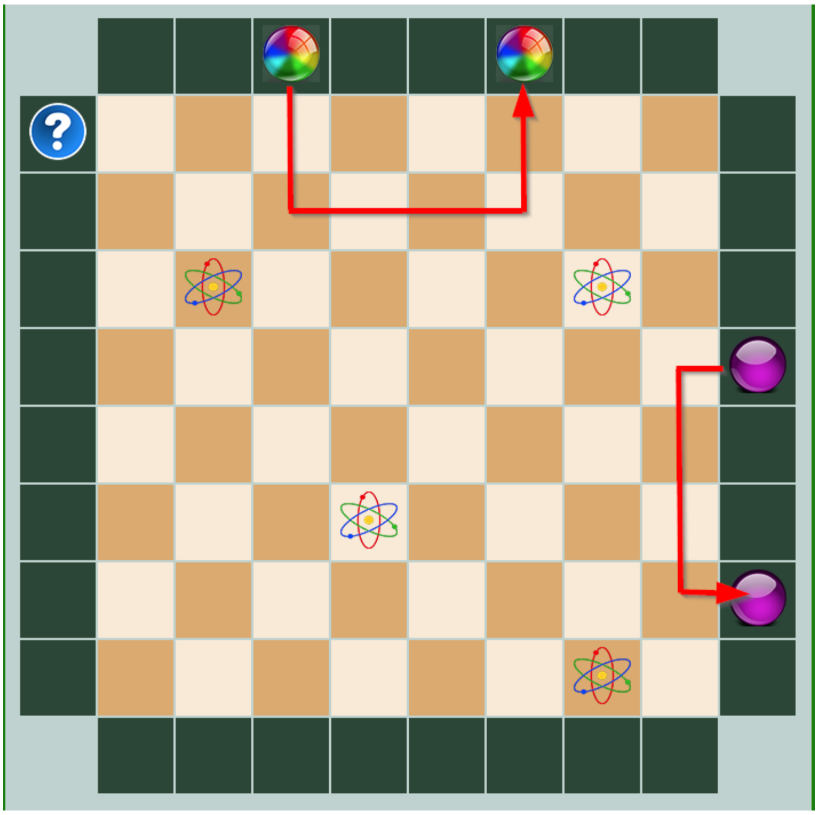
The other circumstance that leads to a reflection is that two deflections cancel each other out. In the experimental field on the left, the beam leads to a reflection due to its interaction with the two atoms in the experimental field.

Misses



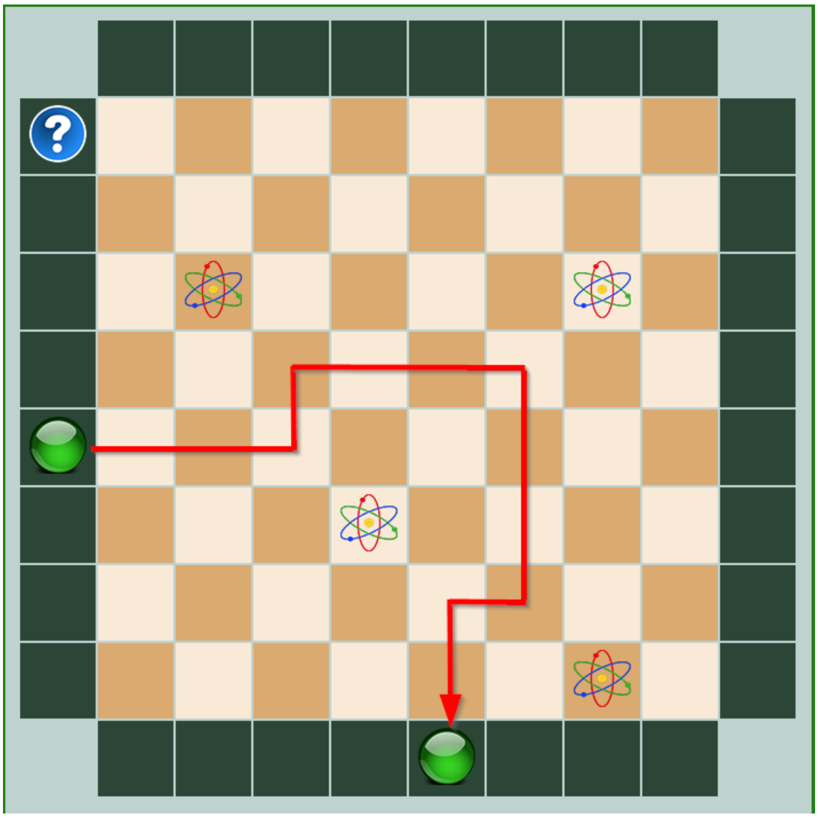
Misses occur when the research beam is not influenced by any atom. For example, the beam on the left in the picture does not interact with any atom on the experimental field.

Detour

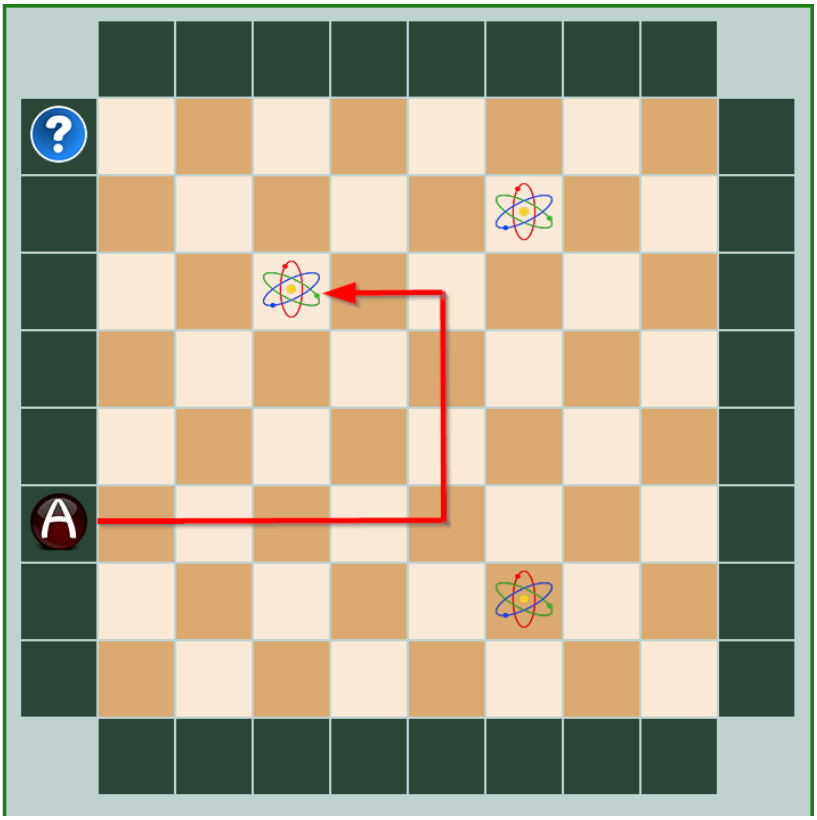


Beams which do not lead to hit reflections or misses are subject to "deflection" by an atom, as already described. This can be a single or a multiple deflection by several atoms. A multiple deflection is called a "detour". A deflection or a detour always has an entry and an exit point, while hits and reflections have only one entry point for a hit and a single entry/exit point for a reflection.

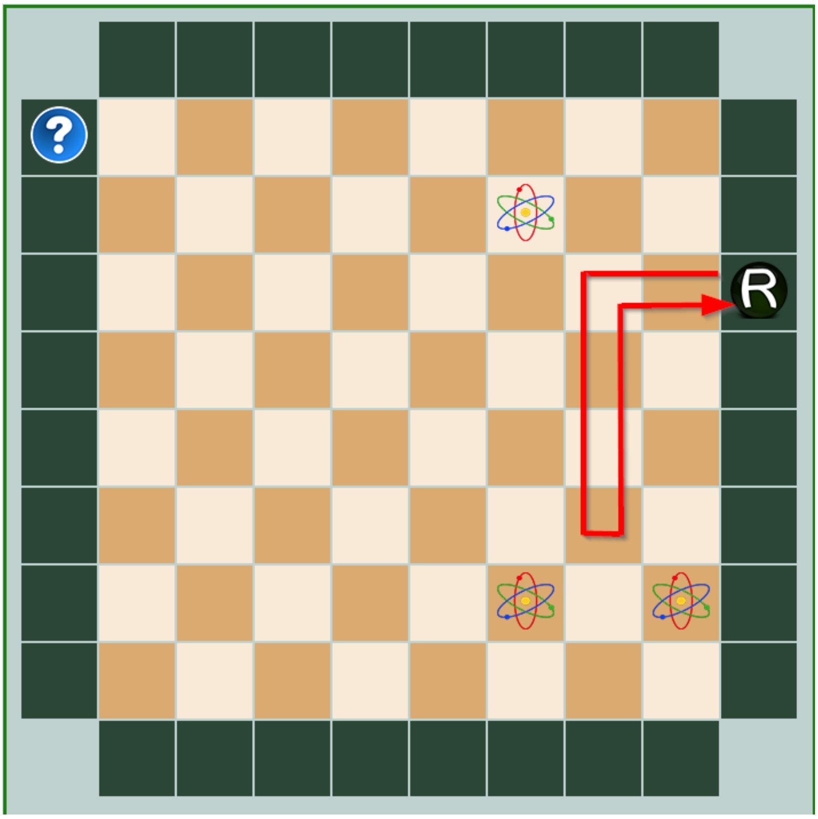
Of course, more complex situations arise when these behaviors interact. The two beams on the left of the image each lead to two deflections.



Beams can have a very convoluted course due to multiple deflections, such as the beam in the image on the left.



Also the hitting of an atom can be caused by a multiple deflection. The beam in the picture on the left is deflected by the first atom, then by the second atom and finally hits the third atom, which leads to a hit or absorption in the final result.

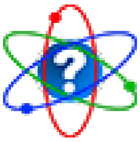


Reflections can also be more complex. The beam in the picture on the left is deflected by the first atom, reflected by the next two atoms, and again deflected by the first atom, resulting in a reflection.

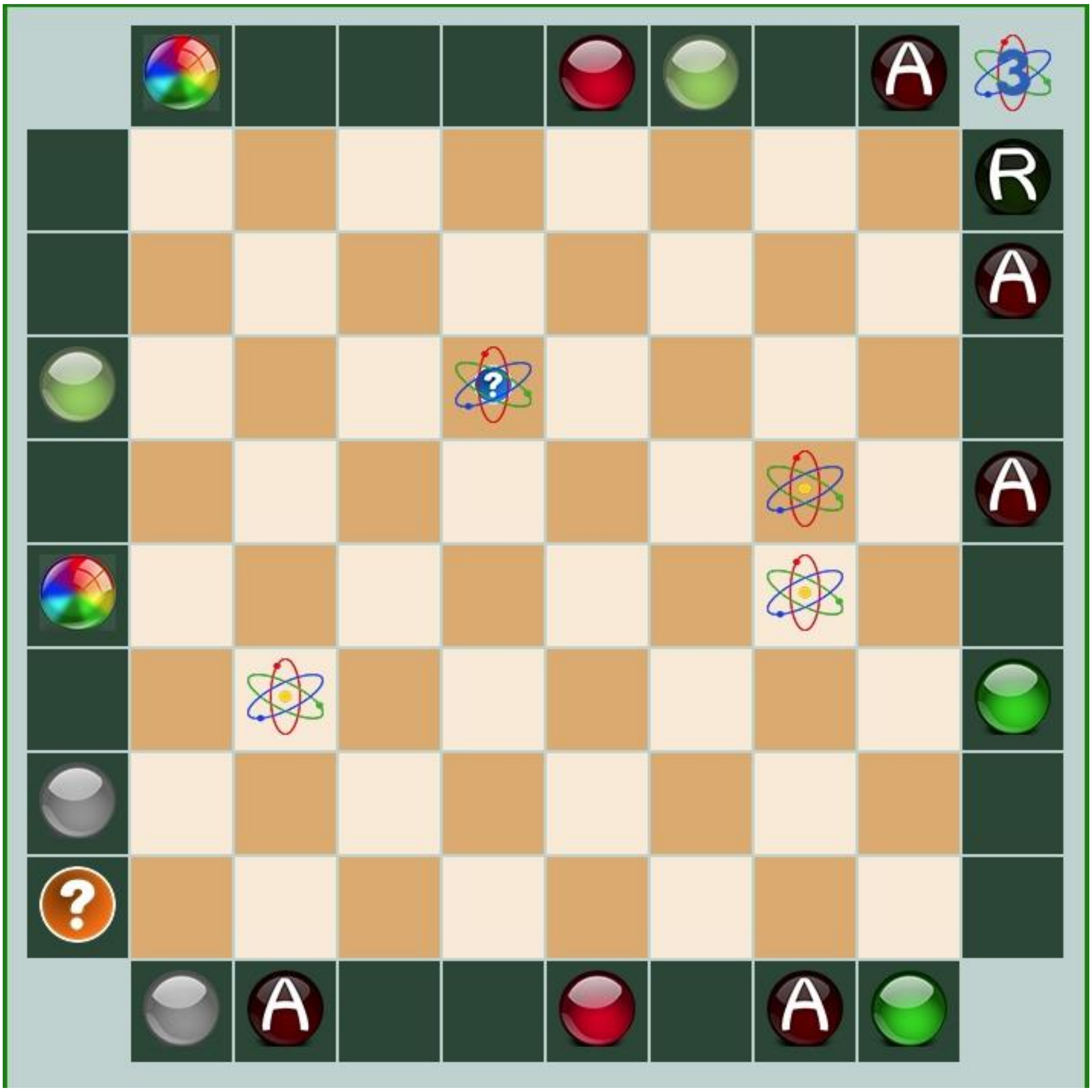
The image above shows the responses to all possible beams for the computer-generated molecule. The query cursor was automatically parked at the top left, since all query fields are needed to display the results.

Of course, the atoms are not visible in a game, they are only shown here to demonstrate the beam paths. Correct and incorrect determined atoms are also not shown on the screenshot, because the setting of the assumed atoms on the experimental field with the subsequent evaluation is still missing.

Setting the atoms and evaluating the result

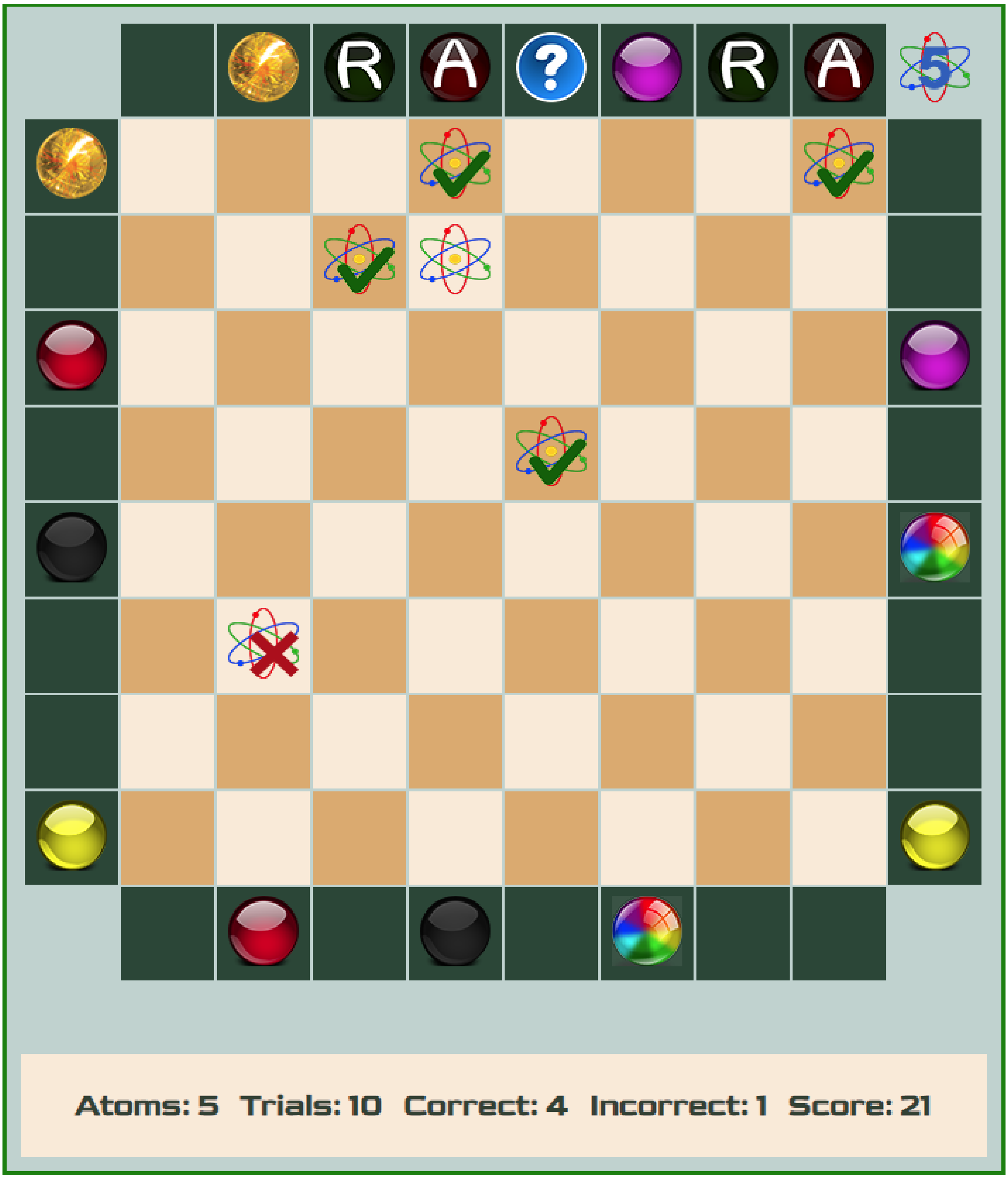


As soon as the player has knowledge about the possible position of one or more atoms, he can set them on the experiment field. To do this, the player switches from query mode to set mode. The [CTRL] key is used to switch back and forth between the query mode and the setting mode. While the set mode is active, the query cursor turns orange and the atom set cursor appears on the experiment field. The set cursor is moved with the four cursor keys on the experiment panel. An atom is set by pressing the [Return] key at the cursor position. A set atom is deleted by pressing the [Return] key again at the cursor position.



The number of atoms set is displayed at the top right above the experiment field. It is not necessary to set all atoms at once. By pressing the [CTRL] key again, you can return to the query mode and fire more beams.

The result can only be queried when all atoms have been placed on the experiment field. To do this, press the [E] key.



The picture above shows an evaluation with the final score. Four atoms were correctly recognized and are marked with a green checkmark. The atom with the red X is guessed wrong. The unmarked atom was not found.

An absorption and a reflection cost one point, a deflection or a miss cost two points. Each atom not detected costs 5 points. The goal of the game is to determine the positions of the atoms at the lowest possible total cost. The lower the score, the better the result.

Press [F5] to start a new game.

Game controls

[CTRL] switches back and forth between query and set mode

Increase number of atoms

[SHIFT] + [Cursor up]

Decrease number of atoms

[SHIFT] + [Cursor down]

Query mode

[Cursor left] moves the query cursor clockwise
[Cursor right] moves the query cursor counterclockwise
[Return] fires an examination beam

Setz-Modus

[Cursor left] moves the set cursor to the left
[Cursor right] moves the set cursor to the right
[Cursor up] moves the set cursor up
[Cursor down] moves the set cursor down
[Return] alternately sets and deletes an atom at the set cursor position

Evaluation

[E] Evaluation and display of the result. All atoms must be set for this

Start a new game

[F5] starts a new game