Appendix B

Matrix Elements

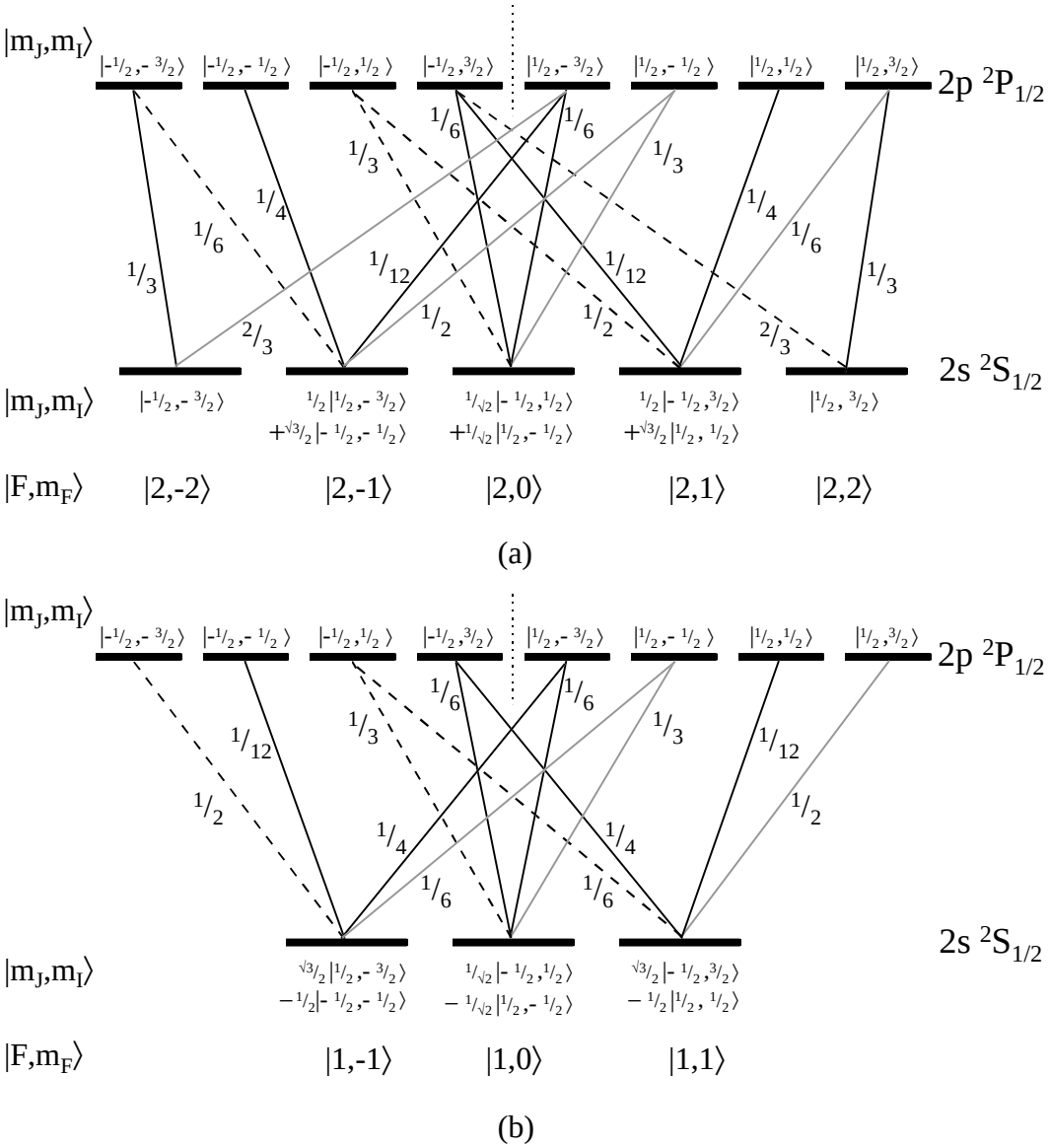

Figure B.1: Relative transition strengths for transitions between $|\downarrow\rangle$ and the $2p\ ^2P_{1/2}$ level. The states are labelled in the $|m_J, m_I\rangle$ basis in the ground and excited states. In addition, for the ground state $2s\ ^2S_{1/2}$, the quantum numbers F and m_F are indicated. Transitions which are driven by σ^+-polarized light are shown in solid gray, those driven by π-polarized light in solid black, and those driven by σ^--polarized light in dashed black. (a) Matrix elements between the ground state, $F = 2$ hyperfine and $2p\ ^2P_{1/2}$ levels. Note that$|F = 2, m_F = -2\rangle \equiv\downarrow$. (b) Matrix elements between the ground state, $F = 1$ hyperfine and $2p\ ^2P_{1/2}$ levels. $|F = 2, m_F = -1\rangle \equiv\uparrow$.

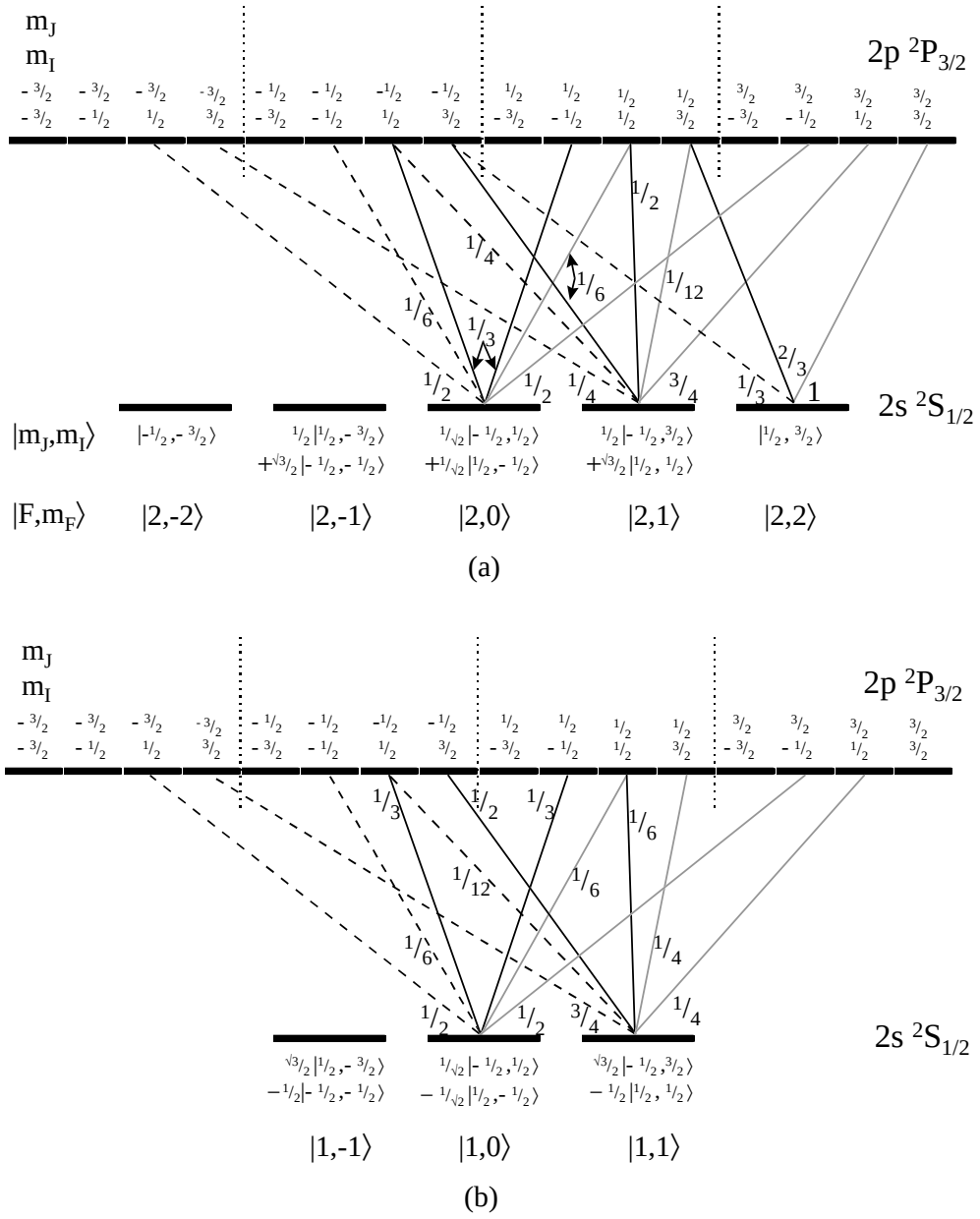

Figure B.2: Relative transition strengths for transitions between $|\downarrow\rangle$ and the $2p\ ^2P_{3/2}$ level. The states are labelled in the $|m_J, m_I\rangle$ basis in the ground and excited states. In addition, for the ground state $2s\ ^2S_{1/2}$, the quantum numbers F and m_F are indicated. For the sake of clarity, the transition strengths are only indicated for the ground states with $m_I \geq 0$. The transition strengths are the same for the states $|m_J, m_I = -|m_I|\rangle$. Transitions which are driven by σ^+-polarized light are shown in solid gray, those driven by π-polarized light in solid black, and those driven by σ^--polarized light in dashed black. (a) Matrix elements between the ground state, $F = 2$ hyperfine and $2p\ ^2P_{3/2}$ levels. Note that$|F = 2, m_F = -2\rangle \equiv \downarrow$. (b) Matrix elements between the ground state, $F = 1$ hyperfine and $2p\ ^2P_{3/2}$ levels. $|F = 2, m_F = -1\rangle \equiv \uparrow$.