An *Ab Initio* Discussion on Anomalous Nuclear Magnetic Moment

王石嵘
161240065

Kuang Yaming Honors School

October 29, 2019

Overview

Introduction

Ab Initio Calculation via QCD

In Chapter 14 of our textbook, a brief introduction of NMR theory is given.
Equation 14.8 gives a naïve magnetic moment

$$\boldsymbol{\mu} = \mu_N \mathbf{I} = \frac{q}{2m_N}\mathbf{I} \tag{1.1}$$

and Equation 14.9 modifies that by introducing g-factor

$$\boldsymbol{\mu} = g\mu_N \mathbf{I} \tag{1.2}$$

or

$$\gamma = g\mu_N \tag{1.3}$$

However, why should we introduce g-factor, and can it be explained physically or calculated *ab initio*?

Nuclear Magnetic Moment, or g-factor, can be measured by experiment, and won't vary in different chemical environments.

However, **why** the g-factors look **"anomalous"**?

	^{1}H	^{2}H	^{7}Li	^{19}F
g	5.58	0.86	2.17	5.25
μ(a.u.)	2.79	0.86	3.25	2.63

Ab Initio Calculation of Proton Magnetic Moment