(II) Three more instances of unethical scientific practice by Prof. B.S. Rajput (and his collaborators) from Kumaun University, Nainital

We discovered a few other cases which also represent, in our view, unethical scientific practice. In each of these papers the authors have claimed results known from earlier work of others (or trivial modifications thereof) as their own result. Although they do refer to the papers from where the results are taken, they do so only in an oblique way, never conveying the impression that they are reviewing the work done in these papers.

1. P. C. Pant, V. P. Pandey and B. S. Rajput, "Dyon-dynamics in supersymmetric theory", was published as a conference proceedings in Indian J. Pure and App. Phys. **38** (2000) 365-370. This paper is very similar to another conference proceedings by V. P. Pandey and B. S. Rajput, "Fermion-dyon dynamics in supersymmetric theories", Indian J. Pure and App. Phys. **38** (2000) 371-376, by the well known correspondence between the the dyon-dyon dynamics and electron-dyon dynamics via electric-magnetic duality.

   We shall focus on the latter paper by Pandey and Rajput. The scientific content of this paper is taken from ref.[1] by D'Hoker and Vinet.

   In order to compare the two papers, one needs to note the following correspondence between the variables used in the two papers:

   $P = e_1 g_2$ of Pandey-Rajput $\leftrightarrow$ q of D'Hoker-Vinet

   $K = e_1 e_2$ of Pandey-Rajput $\leftrightarrow$ α of D'Hoker-Vinet

   α of Pandey-Rajput $\leftrightarrow$ κ of D'Hoker-Vinet

   A few examples of the correspondence between the two papers is as follows:

   Initial Hamiltonian (2.2) of Pandey-Rajput $\leftrightarrow$ (2.16) of D'Hoker-Vinet

   (2.7) of Pandey-Rajput $\leftrightarrow$ (4.10) of D'Hoker-Vinet

The main result eq.(3.23) of Pandey-Rajput is equivalent to eqs.(6.18), (6.15) and (6.19) of D'Hoker-Vinet, with a few errors in Pandey-Rajput paper as described below.

First of all there is a missing overall $-$ sign in the expression for the energy as is the case for bound states. This could be an oversight.

Second, a $+$ is missing inside the square root between $1/4$ and $(q-\lambda)^2$. This is also most likely a typographical error.

Finally, Pande-Rajput use $(q-\lambda)^2$ inside the square root as in D'Hoker-Vinet, but it should in fact by $(P-\lambda)^2$ since they are using P for q. Without this they cannot get their eq.(3.27) after taking $\lambda = P$ as they claim later. In our view this is a strong signal that the material has indeed been taken from D'Hoker and Vinet's paper.

Here is an example of a comparison between the two papers:

Pandey and Rajput, p 373-374:

This H has a $n = 2$ conformal supersymmetry. In addition to the operators Q, $Q^\dagger$ and H, let us also construct the following operators:

$$\begin{aligned}
\mathbf{D} &= \mathbf{\frac{1}{2} i \Big[Z_a \frac{\partial}{\partial Z_a} + \bar{Z}_a \frac{\partial}{\partial \bar{Z}_a} + 2 \Big]} \\
\mathbf{K} &= \mathbf{\bar{Z}_a Z_a} \\
\mathbf{S} &= \mathbf{i \bar{Z}_a} \eta_{\mathbf{a}} \\
\mathbf{S}^\dagger &= \mathbf{-i Z_a} \eta_{\mathbf{a}}^\dagger
\end{aligned}$$

D'Hoker and Vinet [1], p 94:

It is easy to demonstrate that H has an $N = 2$ conformal supersymmetry. In addition to Q, $Q^\dagger$ and H, let us define the following operators:

$$\mathbf{D} = \mathbf{\frac{1}{2} i \Big(z_a \frac{\partial}{\partial z_a} + \bar{z}_a \frac{\partial}{\partial \bar{z}_a} + 2 \Big)},$$

$$\begin{aligned}\mathbf{K} &= \bar{\mathbf{z}}_\mathbf{a}\mathbf{z}_\mathbf{a}\,,\\ \mathbf{S} &= i\bar{\mathbf{z}}_\mathbf{a}\eta_\mathbf{a}\,,\\ \mathbf{S}^\dagger &= -\mathbf{i}\mathbf{z}_\mathbf{a}\eta_\mathbf{a}^\dagger\,,\end{aligned}$$

Except for a few errors, most of the equations in the Pandey and Rajput paper can be traced to some equation in the D'Hoker-Vinet paper. There is no mention in the Pandey-Rajput paper that these equations are taken from D'Hoker and Vinet; instead these are presented as new results derived in their paper.

2. R. Pandey and B. S. Rajput, "Solvable potentials in supersymmetric theories", is another conference proceedings published in Indian J. Pure and App. Phys. **38** (2000) 427-429. The scientific content of this paper is copied from ref.[2] by Dutt, Khare and Sukhatme. In fact most of the part which has been copied from Dutt, Khare and Sukhatme is a review of even earlier work by Gandenshtein. Although the Pandey and Rajput paper refers to the earlier papers, the material is presented as new results rather than review of earlier work.

   We quote the following passages for comparison:

   Pandey and Rajput, p428-429:

   It can be demonstrated that all potentials which exhibit the property of shape invariance can be solved exactly. To meet this end, let us define a sequence $\mathbf{H}^\mathbf{k}$ of the Hamiltonians as:

$$\mathbf{H}^{(\mathbf{k})} = -\frac{\mathbf{d}^2}{\mathbf{dx}^2} + \mathbf{V}_-(\mathbf{x};\mathbf{a}_\mathbf{k}) + \sum_{\mathbf{i}=\mathbf{1}}^{\mathbf{k}} \mathbf{R}(\mathbf{a}_\mathbf{1}) \qquad \ldots(\mathbf{3.2})$$

   where $\mathbf{a}_\mathbf{1} = \mathbf{f}^\mathbf{i}(\mathbf{a}_\mathbf{0}) = \mathbf{f}(\mathbf{a}_\mathbf{0})\mathbf{f}(\mathbf{a}_\mathbf{0})\cdots$ i times.

   Thus we have:

$$\mathbf{H}^{(\mathbf{0})} = \mathbf{H}_- \qquad \ldots(\mathbf{3.3})$$

and

$$\mathbf{H^{(1)} = H_+} \qquad \ldots(\mathbf{3.3a})$$

for all $\mathbf{k > 0}$. $\mathbf{H^{(k)}}$ and $\mathbf{H^{(k+1)}}$ are supersymmetric partner Hamiltonians since we have:

$$\mathbf{H^{(k)} = -\frac{d^2}{dx^2} + V_-(x, a_k) + \sum_{i=1}^{k} R(a_i)}$$

$$\mathbf{H^{(k+1)} = -\frac{d^2}{dx^2} + V_-(x, a_k) + \sum_{i=1}^{k+1} R(a_i)} \qquad \ldots(\mathbf{3.4})$$

Dutt, Khare and Sukhatme[2], p 165-166:

We now show that the eigenstates of shape invariant potentials can be easily obtained. To that purpose, construct a series of Hamiltonians $\mathbf{H^{(s)}}$, $\mathbf{s = 0, 1, 2, \ldots}$, where $\mathbf{H^{(0)} \equiv H_-}$, $\mathbf{H^{(1)} \equiv H_+}$.

$$\mathbf{H^{(s)} = -\frac{\hbar^2}{2m}\frac{d^2}{dx^2} + V_-(k; a_s) + \sum_{k=1}^{s} R(a_k)}\,, \qquad (\mathbf{33})$$

where $\mathbf{a_s = f^s(a_0)}$, i.e., the function f applied s-times. Let us compare the spectrum of $\mathbf{H^{(s)}}$ with that of $\mathbf{H^{(s+1)}}$. In view of Eqs. (32) and (33), we have:

$$\begin{aligned}\mathbf{H^{(s+1)}} &= \mathbf{-\frac{\hbar^2}{2m}\frac{d^2}{dx^2} + V_-(x; a_{s+1}) + \sum_{k=1}^{s+1} R(a_k)} \\ &= \mathbf{-\frac{\hbar^2}{2m}\frac{d^2}{dx^2} + V_+(x; a_s) + \sum_{k=1}^{s} R(a_k)} \qquad (\mathbf{34})\end{aligned}$$

It is clear that although the language used is different, the above passages have the same scientific content, except for some errors on Pandey and Rajput like that in their eq.(3.4) where $V_-(x, a_k)$ should actually be $V_-(x, a_{k+1})$. We also note that the analog of the second line of Dutt, Khare and Sukhatme eq.(34), which is one of the important steps in the argument, is missing in the Pandey-Rajput paper, but nevertheless they go ahead and state the same conclusion. This passage is quoted from near the end of the Pandey-Rajput paper and represents one of the main results of their paper as mentioned in their abstract. This clearly demonstrates that what has been claimed to be new results can at best be considered as a review of earlier results.

3. M. P. Singh and B. S. Rajput, "Supersymmtric theories of Dyons", Indian J. Phys. **73A** (1999) 425-438.

   Most of section 2 and part (a) of section 3 of this paper is taken from ref.[3] by J. Gauntlett. Most of part (b) of section 3 is taken from ref.[4] by J. Blum. In eqs.(2.9)-(2.13) and (3.23)-(3.25) of the Singh-Rajput paper, results for the 't Hooft Polyakov monopole solutions used in papers by Gauntlett and by Blum, have been replaced by the corresponding results for the Julia-Zee dyon solution; however the actual analysis is carried out in the background of the monopole solution as in the papers by Gauntlett[3] and Blum[4]. Much of the material taken from the papers of Gauntlett, and by Blum, in fact were known even earlier, and appear in the Gauntlett and Blum papers as review material.

   We can compare the following passages from the two texts:

   Singh, Rajput, p 434:

   Thus for each fermionic zero mode (3.13) there is a bosonic zero mode

$$\delta \mathbf{W}^{\mathbf{a}}_{\mu} = \mathbf{i}\epsilon^{+}_{+}\mathbf{\Gamma}_{\mu}\psi^{\mathbf{a}} - \mathbf{i}\psi^{\mathbf{a}\dagger}\mathbf{\Gamma}_{\mu}\epsilon_{+} \qquad (\mathbf{3.16})$$

   which also satisfies (2.21)

   Gauntlett[3], p 453:

   Thus for each fermionic zero mode satisfying $\Gamma_5\chi = -\chi$**, we conclude that**

$$\delta \mathbf{W}_{\mu} = \mathbf{i}\epsilon^{\dagger}_{+}\mathbf{\Gamma}_{\mu}\chi - \mathbf{i}\chi^{\dagger}\mathbf{\Gamma}_{\mu}\epsilon_{+} \qquad (\mathbf{3.15})$$

is a bosonic zero mode; it can be further checked that it also satisfies (2.16).

Eq.(3.13) refered to above in Singh-Rajput has the condition $\Gamma_5 \psi^a = -\psi^a$, the same condition refered to in Gauntlett's text [3]. Furthermore eq.(2.21) in Singh-Rajput corresponds to eq.(2.16) in Gauntlett.

Note that eq.(3.16) of Singh-Rajput is one of the results claimed to have been derived in the paper (pairing between bosonic and fermionic zero modes). The above comparison clearly shows that this result was derived earlier by Gauntlett [3].

Although the Singh-Rajput paper refers to the papers by Gauntlett and by Blum, it is presented as a generalization of earlier results rather than a review. This 'generalization' consists of calling the gauge coupling constant $|q|$ instead of q – which amounts to a trivial change in notation. This can be easily seen in the Lagrangian given in eqs.(2.6)-(2.8) or its supersymmetric generalization given in eq.(3.1) of the Singh-Rajput paper.

References

[1] E. D'Hoker and L. Vinet, "Spectrum (Super)Symmetries Of Particles In A Coulomb Potential," Nucl. Phys. B **260**, 79 (1985).

[2] R. Dutt, A. Khare and U. P. Sukhatme, "Supersymmetry, Shape Invariance And Exactly Solvable Potentials," Am. J. Phys. **56**, 163 (1988).

[3] J. P. Gauntlett, "Low-energy dynamics of N=2 supersymmetric monopoles," Nucl. Phys. B **411**, 443 (1994) [arXiv:hep-th/9305068].

[4] J. D. Blum, "Supersymmetric quantum mechanics of monopoles in N=4 Yang-Mills theory," Phys. Lett. B **333**, 92 (1994) [arXiv:hep-th/9401133].