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**UNITED STATES  
SECURITIES AND EXCHANGE COMMISSION**  
Washington, D.C. 20549

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**SCHEDULE 13D**

**Under the Securities Exchange Act of 1934  
(Amendment No. 1)\***

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**Rhythm Pharmaceuticals, Inc.**

(Name of Issuer)

**Common Stock**  
(Title of Class of Securities)

**76243J 10 5**  
(CUSIP Number)

**Todd Foley**  
**MPM Asset Management**  
**450 Kendall Street**  
**Cambridge, MA 01242**  
**Telephone: (617) 425-9200**

(Name, Address and Telephone Number of Person Authorized to Receive Notices and Communications)

**June 25, 2018**  
(Date of Event Which Requires Filing of This Statement)

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If the filing person has previously filed a statement on Schedule 13G to report the acquisition that is the subject of this Schedule 13D, and is filing this schedule because of §§240.13d-1(e), 240.13d-1(f) or 240.13d-1(g), check the following box.

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**Note:** Schedules filed in paper format shall include a signed original and five copies of the schedule, including all exhibits. See §240.13d-7 for other parties to whom copies are to be sent.

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\* The remainder of this cover page shall be filled out for a reporting person's initial filing on this form with respect to the subject class of securities, and for any subsequent amendment containing information which would alter disclosures provided in a prior cover page.

The information required on the remainder of this cover page shall not be deemed to be "filed" for the purpose of Section 18 of the Securities Exchange Act of 1934 ("Act") or otherwise subject to the liabilities of that section of the Act but shall be subject to all other provisions of the Act (however, see the Notes).

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1.	Name of Reporting Persons. I.R.S. Identification No(s). of above person(s) (entities only)  MPM BioVentures V, L.P.	
2.	Check the Appropriate Box if a Member of a Group (See Instructions) (a) <input type="checkbox"/> (b) <input checked="" type="checkbox"/> (1)	
3.	SEC USE ONLY	
4.	Source of Funds (See Instructions)  WC	
5.	Check if Disclosure of Legal Proceedings Is Required Pursuant to Items 2(d) or 2(e)	
6.	Citizenship or Place of Organization  Delaware	
Number of Shares Beneficially Owned by Each Reporting Person With:	7.	Sole Voting Power  2,959,906
	8.	Shared Voting Power  0
	9.	Sole Dispositive Power  2,959,906
	10.	Shared Dispositive Power  0
11.	Aggregate Amount Beneficially Owned by Each Reporting Person  2,959,906	
12.	Check if the Aggregate Amount in Row (11) Excludes Certain Shares (See Instructions)	
13.	Percent of Class Represented by Amount in Row (11)  8.6%(2)	
14.	Type of Reporting Person (See Instructions)  PN	

- (1) This schedule is filed by MPM BioVentures V, L.P. ("BV V"), MPM Asset Management Investors BV5 LLC ("AM LLC"), MPM BioVentures V GP LLC ("BV V GP"), MPM BioVentures V LLC ("BV V LLC") (collectively, the "MPM Entities") and Ansbert Gadicke, Luke Evnin and Todd Foley (collectively, the "Listed Persons" and together with the MPM Entities, the "Filing Persons"). The Listed Persons are members of BV V LLC and AM LLC. The MPM Entities and the Listed Persons expressly disclaim status as a "group" for purposes of this Schedule 13D.
- (2) This percentage is calculated based upon 34,410,725 outstanding shares of common stock, par value \$0.001 per share, of Rhythm Pharmaceuticals, Inc. (the "Issuer"), as disclosed in the Issuer's Quarterly Report on Form 10-Q, filed with the Securities and Exchange Commission on November 9, 2018.

1.	Name of Reporting Persons. I.R.S. Identification No(s). of above person(s) (entities only)	
	MPM Asset Management Investors BV5 LLC	
2.	Check the Appropriate Box if a Member of a Group (See Instructions) (a) <input type="checkbox"/> (b) <input checked="" type="checkbox"/> (1)	
3.	SEC USE ONLY	
4.	Source of Funds (See Instructions)	
	WC	
5.	Check if Disclosure of Legal Proceedings Is Required Pursuant to Items 2(d) or 2(e)	
6.	Citizenship or Place of Organization	
	Delaware	
Number of Shares Beneficially Owned by Each Reporting Person With:	7.	Sole Voting Power
		114,987
	8.	Shared Voting Power
		0
	9.	Sole Dispositive Power
		114,987
	10.	Shared Dispositive Power
		0
11.	Aggregate Amount Beneficially Owned by Each Reporting Person	
	114,987	
12.	Check if the Aggregate Amount in Row (11) Excludes Certain Shares (See Instructions)	
13.	Percent of Class Represented by Amount in Row (11)	
	0.3%(2)	
14.	Type of Reporting Person (See Instructions)	
	OO	

- (1) This Schedule is filed by the MPM Entities and the Listed Persons. The MPM Entities and the Listed Persons expressly disclaim status as a “group” for purposes of this Schedule 13D.
- (2) This percentage is calculated based upon 34,410,725 outstanding shares of common stock, par value \$0.001 per share, of Issuer, as disclosed in the Issuer’s Quarterly Report on Form 10-Q, filed with the Securities and Exchange Commission on November 9, 2018.

1.	Name of Reporting Persons. I.R.S. Identification No(s). of above person(s) (entities only)  MPM BioVentures V GP LLC	
2.	Check the Appropriate Box if a Member of a Group (See Instructions) (a) <input type="checkbox"/> (b) <input checked="" type="checkbox"/> (1)	
3.	SEC USE ONLY	
4.	Source of Funds (See Instructions)  WC	
5.	Check if Disclosure of Legal Proceedings Is Required Pursuant to Items 2(d) or 2(e)	
6.	Citizenship or Place of Organization  Delaware	
Number of Shares Beneficially Owned by Each Reporting Person With:	7.	Sole Voting Power  0
	8.	Shared Voting Power  2,959,906(2)
	9.	Sole Dispositive Power  0
	10.	Shared Dispositive Power  2,959,906(2)
11.	Aggregate Amount Beneficially Owned by Each Reporting Person  2,959,906(2)	
12.	Check if the Aggregate Amount in Row (11) Excludes Certain Shares (See Instructions)	
13.	Percent of Class Represented by Amount in Row (11)  8.6%(3)	
14.	Type of Reporting Person (See Instructions)  OO	

- (1) This Schedule is filed by the MPM Entities and the Listed Persons. The MPM Entities and the Listed Persons expressly disclaim status as a "group" for purposes of this Schedule 13D.
- (2) Represents shares of Common Stock held by BV V. BV V GP and BV V LLC are the direct and indirect general partners of BV V.
- (3) This percentage is calculated based upon 34,410,725 outstanding shares of common stock, par value \$0.001 per share, of Issuer, as disclosed in the Issuer's Quarterly Report on Form 10-Q, filed with the Securities and Exchange Commission on November 9, 2018.

1.	Name of Reporting Persons. I.R.S. Identification No(s). of above person(s) (entities only)	
	MPM BioVentures V LLC	
2.	Check the Appropriate Box if a Member of a Group (See Instructions) (a) <input type="checkbox"/> (b) <input checked="" type="checkbox"/> (1)	
3.	SEC USE ONLY	
4.	Source of Funds (See Instructions)	
	WC	
5.	Check if Disclosure of Legal Proceedings Is Required Pursuant to Items 2(d) or 2(e)	
6.	Citizenship or Place of Organization	
	Delaware	
Number of Shares Beneficially Owned by Each Reporting Person With:	7.	Sole Voting Power
		0
	8.	Shared Voting Power
		2,959,906(2)
	9.	Sole Dispositive Power
		0
	10.	Shared Dispositive Power
		2,959,906(2)
11.	Aggregate Amount Beneficially Owned by Each Reporting Person	
	2,959,906(2)	
12.	Check if the Aggregate Amount in Row (11) Excludes Certain Shares (See Instructions)	
13.	Percent of Class Represented by Amount in Row (11)	
	8.6%(3)	
14.	Type of Reporting Person (See Instructions)	
	OO	

- (1) This Schedule is filed by the MPM Entities and the Listed Persons. The MPM Entities and the Listed Persons expressly disclaim status as a "group" for purposes of this Schedule 13D.
- (2) Includes shares of Common Stock held by BV V. BV V GP and BV V LLC are the direct and indirect general partners of BV V.
- (3) This percentage is calculated based upon 34,410,725 outstanding shares of common stock, par value \$0.001 per share, of Issuer, as disclosed in the Issuer's Quarterly Report on Form 10-Q, filed with the Securities and Exchange Commission on November 9, 2018.

1.	Name of Reporting Persons. I.R.S. Identification No(s). of above person(s) (entities only)	
	Ansbert Gadicke	
2.	Check the Appropriate Box if a Member of a Group (See Instructions) (a) <input type="checkbox"/> (b) <input checked="" type="checkbox"/> (1)	
3.	SEC USE ONLY	
4.	Source of Funds (See Instructions)	
	OO	
5.	Check if Disclosure of Legal Proceedings Is Required Pursuant to Items 2(d) or 2(e)	
6.	Citizenship or Place of Organization	
	United States	
Number of Shares Beneficially Owned by Each Reporting Person With:	7.	Sole Voting Power
		0
	8.	Shared Voting Power
		3,074,893(2)
	9.	Sole Dispositive Power
		0
	10.	Shared Dispositive Power
		3,074,893(2)
11.	Aggregate Amount Beneficially Owned by Each Reporting Person	
	3,074,893(2)	
12.	Check if the Aggregate Amount in Row (11) Excludes Certain Shares (See Instructions)	
13.	Percent of Class Represented by Amount in Row (11)	
	8.9%(3)	
14.	Type of Reporting Person (See Instructions)	
	IN	

- (1) This Schedule is filed by the MPM Entities and the Listed Persons. The MPM Entities and the Listed Persons expressly disclaim status as a "group" for purposes of this Schedule 13D.
- (2) Includes 2,959,906 shares of Common Stock held by BV V and 114,987 shares of Common Stock held by AM LLC. BV V GP and BV V LLC are the direct and indirect general partners of BV V. The Reporting Person is a member of BV V LLC.
- (3) This percentage is calculated based upon 34,410,725 outstanding shares of common stock, par value \$0.001 per share, of Issuer, as disclosed in the Issuer's Quarterly Report on Form 10-Q, filed with the Securities and Exchange Commission on November 9, 2018.

1.	Name of Reporting Persons. I.R.S. Identification No(s). of above person(s) (entities only)	
	Luke Evnin	
2.	Check the Appropriate Box if a Member of a Group (See Instructions) (a) <input type="checkbox"/> (b) <input checked="" type="checkbox"/> (1)	
3.	SEC USE ONLY	
4.	Source of Funds (See Instructions)	
	OO	
5.	Check if Disclosure of Legal Proceedings Is Required Pursuant to Items 2(d) or 2(e)	
6.	Citizenship or Place of Organization	
	United States	
Number of Shares Beneficially Owned by Each Reporting Person With:	7.	Sole Voting Power
		0
	8.	Shared Voting Power
		3,074,893(2)
	9.	Sole Dispositive Power
		0
	10.	Shared Dispositive Power
		3,074,893(2)
11.	Aggregate Amount Beneficially Owned by Each Reporting Person	
	3,074,893(2)	
12.	Check if the Aggregate Amount in Row (11) Excludes Certain Shares (See Instructions)	
13.	Percent of Class Represented by Amount in Row (11)	
	8.9%(3)	
14.	Type of Reporting Person (See Instructions)	
	IN	

- (1) This Schedule is filed by the MPM Entities and the Listed Persons. The MPM Entities and Listed Persons expressly disclaim status as a “group” for purposes of this Schedule 13D.
- (2) Includes 2,959,906 shares of Common Stock held by BV V and 114,987 shares of Common Stock held by AM LLC. BV V GP and BV V LLC are the direct and indirect general partners of BV V. The Reporting Person is a member of BV V LLC.
- (3) This percentage is calculated based upon 34,410,725 outstanding shares of common stock, par value \$0.001 per share, of Issuer, as disclosed in the Issuer’s Quarterly Report on Form 10-Q, filed with the Securities and Exchange Commission on November 9, 2018.

1.	Name of Reporting Persons. I.R.S. Identification No(s). of above person(s) (entities only)	
	Todd Foley	
2.	Check the Appropriate Box if a Member of a Group (See Instructions) (a) <input type="checkbox"/> (b) <input checked="" type="checkbox"/> (1)	
3.	SEC USE ONLY	
4.	Source of Funds (See Instructions)	
	OO	
5.	Check if Disclosure of Legal Proceedings Is Required Pursuant to Items 2(d) or 2(e)	
6.	Citizenship or Place of Organization	
	United States	
Number of Shares Beneficially Owned by Each Reporting Person With:	7.	Sole Voting Power
		0
	8.	Shared Voting Power
		3,074,893(2)
	9.	Sole Dispositive Power
		0
	10.	Shared Dispositive Power
		3,074,893(2)
11.	Aggregate Amount Beneficially Owned by Each Reporting Person	
	3,074,893(2)	
12.	Check if the Aggregate Amount in Row (11) Excludes Certain Shares (See Instructions)	
13.	Percent of Class Represented by Amount in Row (11)	
	8.9%(3)	
14.	Type of Reporting Person (See Instructions)	
	IN	

- (1) This Schedule is filed by the MPM Entities and the Listed Persons. The MPM Entities and the Listed Persons expressly disclaim status as a “group” for purposes of this Schedule 13D.
- (2) Includes 2,959,906 shares of Common Stock held by BV V and 114,987 shares of Common Stock held by AM LLC. BV V GP and BV V LLC are the direct and indirect general partners of BV V. The Reporting Person is a member of BV V LLC.
- (3) This percentage is calculated based upon 34,410,725 outstanding shares of common stock, par value \$0.001 per share, of Issuer, as disclosed in the Issuer’s Quarterly Report on Form 10-Q, filed with the Securities and Exchange Commission on November 9, 2018.

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This Amendment No. 1 to Schedule 13D (“Amendment No. 1”) is being filed as an amendment to the initial statement on Schedule 13D relating to the Common Stock, par value \$0.001 per share (the “Common Stock”), of Rhythm Pharmaceuticals, Inc. (the “Issuer”), as filed with the Securities and Exchange Commission (the “SEC”) on October 24, 2017 (the “Original Schedule 13D”).

All capitalized terms not otherwise defined herein shall have the meaning ascribed to the terms in the Original Schedule 13D. The Original Schedule 13D is hereby amended and supplemented as follows and, except as expressly amended below, the Original Schedule 13D remains in full force and effect.

**Item 3. Source and Amount of Funds or Other Consideration**

“Item 3. Source and Amount of Funds or Other Consideration” of the Original Schedule 13D is hereby amended by adding the following at the end thereof:

On June 25, 2018, the MPM Entities purchased an aggregate of 378,501 shares of Common Stock in a public offering by the Issuer (the “Offering”) at the public offering price of \$26.42 per share. The source of funds for such purchase was the working capital of the MPM Entities and capital contributions made to the MPM Entities by its partners.

**Item 4. Purpose of Transaction**

“Item 4. Purpose of Transaction” of the Original Schedule 13D is hereby amended by adding the following to the end thereof:

The Issuer completed the Offering on June 25, 2008. The MPM Entities participated in the Offering and acquired the Shares for a total purchase price of \$9,999,997. The MPM Entities participated in the Offering for investment purposes and in order to provide funding to the Issuer.

Subject to applicable legal requirements, one or more of the Reporting Persons may purchase additional securities of the Issuer from time to time in open market or private transactions, depending on their evaluation of the Issuer’s business prospects or financial condition, the market for the Issuer’s securities, developments concerning the Issuer, the reaction of the Issuer to the Reporting Persons’ ownership of the Issuer’s securities, other opportunities available to the Reporting Persons, and general economic, money market and stock market conditions. In addition, depending upon the factors referred to above, the Reporting Persons may dispose of all or a portion of their securities of the Issuer at any time. Each of the Reporting Persons reserves the right to increase or decrease its holdings on such terms and at such times as each may decide.

The Reporting Persons have no current plan or proposal which relates to, or may result in, any of the matters listed in Items 4(a) – (j) of Schedule 13D.

**Item 5. Interest in Securities of the Issuer**

“Item 5. Interest in Securities of the Issuer” is hereby amended and restated in its entirety as follows:

(a) – (b) The following information with respect to the ownership of the Common Stock of the Issuer by the Filing Persons is provided as of the date of this filing:

<b>Reporting Person</b>	<b>Shares Held Directly</b>	<b>Sole Voting Power</b>	<b>Shared Voting Power</b>	<b>Sole Dispositive Power</b>	<b>Shared Dispositive Power</b>	<b>Beneficial Ownership</b>	<b>Percentage of Class (1)</b>
BV V	2,959,906	2,959,906	0	2,959,906	0	2,959,906	8.6%
AM LLC	114,987	114,987	0	114,987	0	114,987	0.3%
BV V GP(2)	0	0	2,959,906	0	2,959,906	2,959,906	8.6%
BV V LLC(2)	0	0	2,959,906	0	2,959,906	2,959,906	8.6%
Ansbert Gadicke(3)	0	0	3,074,893	0	3,074,893	3,074,893	8.9%
Luke Evnin(3)	0	0	3,074,893	0	3,074,893	3,074,893	8.9%
Todd Foley(3)	0	0	3,074,893	0	3,074,893	3,074,893	8.9%

(1) This percentage is calculated based upon 34,410,725 outstanding shares of common stock, par value \$0.001 per share, of Issuer, as disclosed in the Issuer’s Quarterly Report on Form 10-Q, filed with the Securities and Exchange Commission on November 9, 2018.

(2) Includes securities held by BV V. BV V GP and BV V LLC are the direct and indirect general partners of BV V.

(3) Includes securities held by BV V and AM LLC. The Reporting Person is a member of BV V LLC.

(c) The information provided in Item 3 is hereby incorporated by reference. Each Filing Person disclaims membership in a “group.” Each Filing Person also disclaims beneficial ownership of any shares of the Issuer, except for the shares set forth in the table above next to the respective Filing Person’s name in subsection (b) of this Item 5.

(d) Inapplicable.

(e) Inapplicable.

**Item 7. Material to Be Filed as Exhibits**

A. Amended and Restated Investors’ Rights Agreement by and among the Issuer and each of the investors listed on Exhibit A thereto, dated as of August 21, 2017 (incorporated by reference to Exhibit 4.2 to the Issuer’s Registration Statement on Form S-1 (SEC File No. 333-220337), filed with the SEC on September 5, 2017).

B. Agreement regarding filing of joint Schedule 13D.

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Signatures

After reasonable inquiry and to the best of my knowledge and belief, I certify that the information set forth in this statement is true, complete and correct.

Date: February 11, 2019

**MPM BIOVENTURES V GP LLC**

By: MPM BioVentures V LLC,  
its Managing Member

By: /s/ Todd Foley

Name: Todd Foley

Title: Member

**MPM BIOVENTURES V LLC**

By: /s/ Todd Foley

Name: Todd Foley

Title: Member

**MPM BIOVENTURES V, L.P.**

By: MPM BioVentures V GP LLC, its General Partner

By: MPM BioVentures V LLC, its Managing Member

By: /s/ Todd Foley

Name: Todd Foley

Title: Member

**MPM ASSET MANAGEMENT INVESTORS BV5 LLC**

By: /s/ Howard Rubin

Name: Howard Rubin

Title: Director

By: /s/ Todd Foley

Name: Todd Foley

By: /s/ Luke Evnin

Name: Luke Evnin

By: /s/ Ansbert Gadicke

Name: Ansbert Gadicke

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**Schedule I**

**General Partners/Members**

Ansbert Gadicke  
c/o MPM Asset Management  
450 Kendall Street  
Cambridge, MA 02142  
Principal Occupation: Member of the managing member of the general partner of MPM BioVentures V,  
L.P. Citizenship: USA

Luke Evinin  
c/o MPM Asset Management  
450 Kendall Street  
Cambridge, MA 02142  
Principal Occupation: Member of the managing member of the general partner of MPM BioVentures V, L.P.  
Citizenship: USA

Todd Foley  
c/o MPM Asset Management  
450 Kendall Street  
Cambridge, MA 02142  
Principal Occupation: Member of the managing member of the general partner of MPM BioVentures V, L.P.  
Citizenship: USA

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**Exhibit Index**

A. Amended and Restated Investors' Rights Agreement by and among the Issuer and each of the investors listed on Exhibit A thereto, dated as of August 21, 2017 (incorporated by reference to Exhibit 4.2 to the Issuer's Registration Statement on Form S-1 (SEC File No. 333-220337), filed with the SEC on September 5, 2017).

B. Agreement regarding filing of joint Schedule 13D.

**Exhibit B**

**Joint Filing Statement**

I, the undersigned, hereby express my agreement that the attached Schedule 13D (and any amendments thereto) relating to the beneficial ownership by the undersigned of the equity securities of Rhythm Pharmaceuticals, Inc. is filed on behalf of each of the undersigned.

Date: February 11, 2019

**MPM BIOVENTURES V GP LLC**

By: MPM BioVentures V LLC,  
its Managing Member

By: /s/ Todd Foley

Name: Todd Foley

Title: Member

**MPM BIOVENTURES V LLC**

By: /s/ Todd Foley

Name: Todd Foley

Title: Member

**MPM BIOVENTURES V, L.P.**

By: MPM BioVentures V GP LLC, its General Partner

By: MPM BioVentures V LLC, its Managing Member

By: /s/ Todd Foley

Name: Todd Foley

Title: Member

**MPM ASSET MANAGEMENT INVESTORS BV5 LLC**

By: /s/ Howard Rubin

Name: Howard Rubin

Title: Director

By: /s/ Todd Foley

Name: Todd Foley

By: /s/ Luke Evnin

Name: Luke Evnin

By: /s/ Ansbert Gadicke

Name: Ansbert Gadicke